FOS001

PORT SITE RESECTION DOES NOT IMPROVE SURVIVAL IN INCIDENTAL GALLBLADDER CANCER BY THE AFC-GBC-2009 STUDY GROUP

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Introduction: Incidental gallbladder cancer (IGBC) is frequently discovered on the specimen when laparoscopic cholecystectomy (LC) for a benign disease is performed. The objective of the present study was to assess the role of port site excision IGBC patients in a French registry.

Methods: Data on patients with IGBC identified after LC between 1998 and 2008 were retrospectively collated in a French, multicenter database. Those subjected to port site resection were compared with patients who underwent resection without port site removal and analyzed for differences in recurrence patterns and survival. Among 218 patients with IGBC after LC, 148 underwent re-resection with curative-intent; 54 patients had port site resection and 94 did not.

Results: Both groups were comparable according to demographic data (gender $p = 0.54$, age > 70 $p = 0.85$, comorbidities), surgical procedures (major resection $p = 0.08$, lymphadenectomy $p = 0.09$, common bile duct resection $p = 0.75$) and postoperative morbidity ($p = 0.29$). In the resected port site group, depth of tumor invasion was T1b = 6, T2 = 24, T3 = 22, T4 = 2, no significantly different from patients with no port site excision ($p = 0.69$). Port site metastasis was observed in only 1 (2%) patient with T3 tumor who died with peritoneal metastases 15 months after resection. Port site excision did not improve the overall survival (77%, 58%, 21% at 1, 3, 5-year respectively) compared to patient with no port site excision (78%, 55%, 33% at 1, 3, 5-year respectively, $p = 0.37$).

Conclusion: In patients with IGBC, port site excision was not associated with improved survival and should not be considered mandatory during definitive surgical treatment.

FOS002

BILIRUBIN LEVEL IN THE DRAINAGE FLUID IS AN EARLY AND INDEPENDENT PREDICTOR OF BILE LEAKAGE AFTER HEPATIC RESECTION

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Introduction: Variations in the definition of bile leakage after hepatic resection have prevented identification of risk factors for early diagnosis and efficient management. The ISGLS definition standardizes reporting of this complication. It was the aim of the present study to prospectively validate the ISGLS definition of bile leakage after hepatic resection. Furthermore, we sought to identify early predictors of clinically relevant bile leakage.

Methods: A total of 265 patients who underwent elective hepatic resection were enrolled prospectively. Bilirubin concentrations were determined in the serum and drainage fluid until postoperative day (POD) five. Risk factors of Grade B/C bile leakage were assessed using univariate and multivariate analyses.

Results: Bile leakage was diagnosed in 72 (27.2%) patients and classified into Grade A, B and C leakage in 23 (8.7%), 38 (14.3%) and 11 (4.1%) patients. Perioperative mortality was 0% for Grade A, 5.2% for Grade B and 45.4% for Grade C leakage ($p < 0.0001$). On univariate analysis, anatomic resection ($p = 0.03$), intraoperative blood loss >1 l ($p = 0.01$), operating time >240 minutes ($p = 0.0003$) and bilirubin concentration in the drainage fluid >2.4 mg/dl on postoperative day 2 ($p < 0.0001$) were associated with Grade B/C bile leakage. Multivariate analysis confirmed bilirubin concentration in the drainage fluid >2.4 mg/dl on postoperative day 2 ($p < 0.0001$) and anatomic resection ($p = 0.04$) as independent predictors of bile leakage.

Conclusion: The ISGLS definition and severity grading of bile leakage after hepatic resection is clinically meaningful. Bilirubin concentration in the drainage fluid on postoperative day two is a strong predictor of clinically relevant bile leakage.

FOS003

DEFINITION OF T3/4 AND REGIONAL LYMPH NODES IN GALLBLADDER CANCER: WHICH IS MORE VALID, THE UICC OR THE JAPANESE STAGING SYSTEM?

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Introduction: The staging of gallbladder cancer differ between the Union Internationale Contre Le Cancer (UICC) and the Japanese Society of Biliary Surgery (JSBS) staging

systems especially in that hepatic invasion with or without invasion of another organ is defined as T3 by the UICC, but as either T3 or T4 by the JSBS, and that posterosuperior pancreatic lymph node (PSPLN) metastasis is defined as M1 by the UICC, but as N2 by the JSBS.
Methods: The survival of 224 patients who underwent macroscopically curative resection for gallbladder cancer was evaluated. The influence of the differences between the two staging systems on the postoperative survival was assessed.
Results: For stage III or IV, the survival curves could be stratified better by the JSBS staging. Fifty seven patients were classified as UICC-T3 but JSBS-T4. These patients showed better survival than 43 patients with UICC-T4/JSBS-T4 and comparable survival with 17 patients with UICC-T3/JSBS-T3. UICC-stage IIIB composed of two subgroups: U-T2N1, 18 patients; U-T3N1, 21 patients. Five-year survival of the two subgroups was 85% and 41%, respectively (P = 0.01). The latter was comparable with that of 28 patients with T3N0 (35%, P = 0.93). The survival of the UICC-M1 restricted to PSPLNs was significantly better than that of the UICC-M1 beyond PSPLNs (5-year survival, 35% vs. 17%; P = 0.04).
Conclusion: Although T category is more accurately defined by UICC, the prognosis of patients with gallbladder cancer is better stratified by JSBS staging mainly because UICC-stage IIIB includes T1/2N1M0 that shows significantly better survival than T3N0M0. PSPLN may well be classified as regional lymph node.

FOS004
IS T-TUBE PLACEMENT STILL NECESSARY AFTER A COMMON BILE DUCT EXPLORATION?

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Introduction: T-tube insertion after common bile duct exploration (CBDE) used to be common practice, but there are other alternatives that can be used. This study aims to compare the post-operative outcomes of patients who underwent T-tube insertion or other methods of closure (biliary stenting, ERCP stent left in-situ, primary closure without stenting) after CBDE.
Methods: A retrospective study on results of common bile duct explorations (CBDE) with different forms of bile duct drainage (or no drainage) performed between January 2006 and April 2009 in our institution.
Results: Among 49 CBDE performed, 23 (47%) were laparoscopic, and 26 (53%) were open explorations. T-tubes were inserted in 15 patients (30.6%); 6 (12.2%) had biliary stenting; 10 (20.4%) had previously inserted ERCP stents left in-situ, and 18 (36.7%) had primary closure without any stenting. These were transcystic (25, 51%) or transductal (24, 49%). There were no mortalities. All explorations were successful and there were no retained stones. Comparing T-tube (Group I, n = 15) against the others (Group II, n = 34), Group I had a statistically longer length of hospital stay (p = 0.002), and longer time to regain independent ambulation (p = 0.007). Group I and II had a complication rate of 33.3% (5/15) and 20.6% (7/34) respectively (p = 0.339).
Conclusion: T-tube insertion after CBDE is associated with longer hospital stays and longer recovery of independent ambulation, as compared to other methods of closure. T-tube insertion should not be routinely done after CBDE.

FOS005
THE ROLE OF 99MTECHNETIUM-LABELLED HEPATO IMINO DIACETIC ACID (HIDA) SCAN IN THE MANAGEMENT OF BILIARY PAIN

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Introduction: Biliary pain is a common presentation in the acute surgical take and the surgical clinic. In patients with normal ultrasound findings, symptoms can sometimes be disregarded as being non-specific. We propose that in this cohort, a HIDA scan is a useful investigation, and patients with a positive test have good results following cholecystectomy.
Methods: We obtained reports of all HIDA scans with an abnormal ejection fraction (EF < 40%) performed in our centre from 15/05/2007 to 28/12/2010. This database was cross-linked with a prospectively-maintained database and electronic records of patients undergoing cholecystectomy in the same period. All patients with a positive HIDA who went on to have laparoscopic cholecystectomy (LC) were followed up by a review of the electronic records, and a telephone interview to assess symptom improvement.
Results: 50 patients were investigated. Mean age was 48, and majority were female. Ultrasound findings revealed normal gall bladder (no stones) in 96%. 92% of patients were happy with the decision to proceed with LC, and 87.5% felt that their symptoms were improved (62.5% 'Very Much Improved'). Post-operatively, 56.3% had no residual pain whatsoever and 31.3% had only occasional mild discomfort. The histology was pathological in 83%; 29% had stones in the gall bladder. During the HIDA scan, injection of a CCK-analogue caused pain in 56%. Symptoms were 'Very Much Improved' after LC in 74% and 44% respectively in the responders and non-responders to CCK-analogue injection. The sensitivity of CCK-analogue injection was 68% and specificity was 50%.
Conclusion: HIDA scan is a useful clinical tool in the diagnosis and management of patients with typical biliary pain and normal ultrasound findings. Outcomes following LC in this cohort of patients are favourable, with high patient satisfaction. The injection of a CCK analogue is a sensitive adjunct to the test, but non-response does not rule out benefit from LC.

FOS006

HEPATIC RESECTION FOR BILATERAL HEPATOLITHIASIS: LONG-TERM RESULTS

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Introduction: There are increased evidence showing that hepatic resection is probably the best definitive treatment for unilateral hepatolithiasis. However, the role of hepatic resection for bilateral hepatolithiasis is rarely mentioned in the literature. This study aims to evaluate and compare the outcomes between unilateral and bilateral hepatolithiasis after undergoing hepatic resection.

Methods: From Dec 1987 to Dec 2007, a total of 156 patients with unilateral hepatolithiasis were defined in the group UNI and 41 patients with bilateral hepatolithiasis were defined in the group BI. All patients underwent hepatic resection for their hepatolithiasis. The short-term and long-term outcomes in terms of blood loss, operating time, stones clearance rate, perioperative morbidities, stones recurrence rate, incidence of subsequent cholangiocarcinoma and the long-term mortality rates were evaluated.

Results: The group BI had longer operating time (200 minutes vs 173 minutes, $p = 0.006$), lower immediate stones clearance rate (56.1% vs 91.7%, $p < 0.001$), lower final stones clearance rate (75.6% vs 94.9%, $p = 0.001$), higher rate of stones recurrence (22.6% vs 6.1%, $p = 0.009$) and disease related mortality (19.5% vs 5.1%, $p = 0.006$).

Conclusion: Bilateral hepatolithiasis has worse outcomes than unilateral hepatolithiasis after being treated with hepatic resection. It deserves to be considered as a distinct disease.

FOS007

FIBRIN SEALANT FOR PREVENTION OF RESECTION SURFACE-RELATED COMPLICATIONS AFTER LIVER RESECTION

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Introduction: Bile leakage, bleeding and abscess formation are major resection surface-related complications after liver resection. It is unclear whether application of fibrin sealant to the resection surface is effective in reducing these complications. Objective of this study is to evaluate efficacy of fibrin sealant in reducing resection surface-related complications in liver surgery.

Methods: In a multicenter, randomized trial in 310 non-cirrhotic patients undergoing liver resection, we compared prophylactic application of fibrin sealant to the resection surface (156 patients) with no application of fibrin sealant (154 patients). In addition to clinical assessments, patients underwent protocolized CT-scan one week postoperatively. Primary endpoint was a composite of postoperative resection surface-related complications (bile leakage, bleeding or abscess), as adjudicated by a clinical-events committee that was unaware of the study-groups assignments.

Results: Overall rate of resection surface-related complications was not different between the two groups: 24% (38/156 patients) in the fibrin sealant group and 24% (37/154 patients) in the control group. Bile leakage was detected in 14% of patients in the fibrin sealant group and in 14% of controls. CT-scans showed a fluid collection at the resection surface larger than 100 L in 28% of patients in the fibrin sealant group and in 26% of controls ($P = 0.800$). The rate of reinterventions for resection surface-related complications (12% vs. 10%; $P = 0.492$) and severity of complications did also not differ between the two groups.

Conclusion: This randomized multicenter trial shows that prophylactic application of fibrin sealant at the resection surface after liver resections does not lead to a reduction in the incidence or severity of postoperative bile leakage or other resection surface-related complications.

FOS008

ROLE OF PROLYL HYDROXYLASE 1 IN LIVER CIRRHOSIS

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Introduction: Various liver diseases end up in irreversible liver cirrhosis (LC). Pro-fibrotic cascades are promoted by oxidative stress, caused by decreased antioxidative enzyme activity and presence of reactive oxygen species (ROS). Loss or inhibition of the molecular oxygen sensor, prolyl hydroxylase domain enzyme 1 (PHD1), induces hypoxia tolerance of liver tissue via molecular adaption of hepatocyte metabolism. We therefore hypothesized that PHD1 deficiency or pan-inhibition of PHD1-3 reduces LC in mice.

Methods: Two distinct models of LC were applied in PHD1 and PHD3 knock out (KO) or corresponding wild type (WT) mice: (i) To induce acute cholestatic LC, common bile duct (CBD) ligation was performed along with cholecystectomy. Control animals underwent sham OP and cholecystectomy. Laboratory values and liver histology were subsequently assessed to screen for fibrotic liver damage. (ii) To mimic chronic toxic LC, mice were gavaged with 5-diethoxycarbonyl-1,4-dihydrocollidine (DDC) or vehicle control for 4 or 6 weeks. In a translational approach, WT mice were subjected to i.p. injection of pharmacologic PHD enzyme inhibitors (EDHB, ICA) or vehicle control prior to induction of LC via CBD ligation.

Results: Histologic analyses revealed comparable parenchymal liver damage in PHD1 KO and WT mice 5 days after induction of acute cholestatic LC. Impairment of liver protein synthesis was however significantly attenuated in PHD1 KO mice compared to their WT littermates or to PHD3 KO mice.

6 weeks after induction of chronic LC, liver body weight ratio (LBWR) was significantly lower in PHD1 KO compared to WT mice, indicating attenuated parenchymal damage. Consistently, histological analyses revealed significantly reduced cirrhotic damage of PHD1 KO livers.

Pharmacological inhibition of PHD-enzymes significantly attenuated the impairment of liver function in mice subjected to acute cholestatic LC as indicated by attenuated levels of serum bilirubin.

Conclusion: Loss of PHD1 in mice improves liver function in acute cholestatic LC, and minimizes the extent of liver parenchymal damage in chronic LC. Pharmacological PHD-inhibition is likewise protective against liver cirrhosis in mice, and might therefore represent a promising approach for organ protection in cholestatic and cirrhotic liver disease.

FOS009
IMPACT OF 3D-CT ANALYSIS IN PREOPERATIVE PLANNING FOR HILAR CHOLANGIOCARCINOMA

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Introduction: Hepatic hilum has complicated and variable anatomy of the bile duct, portal vein and hepatic artery. Preoperative precise anatomical understanding for hepatic hilum is necessary for curative and safe resection of hilar cholangiocarcinoma. Recently, due to advancement of 3D imaging technology, surgeons can obtain 3D images easily. The aim of this study is to clarify the usefulness of 3D-CT image of the hepatic hilum for preoperative simulation of hepatectomy for hilar cholangiocarcinoma.

Methods: 118 patients with hilar cholangiocarcinoma who underwent resection between 1992 and 2011 were enrolled in this study. The patients was divided into two groups of 2D group (n = 63) which did preoperative diagnosis by 2D-CT, angiography and cholangiography and 3D group (n = 55) who added a 3D-CT images. 3D group underwent preoperative multidetector row computed tomography (MDCT) cholangiography; 3D images of the portal vein, hepatic artery and bile ducts were created and viewed simultaneously using software (Liver Explorer, MeVis, Bremen, Germany). Several perioperative factors and survival rates were compared between two groups.

Results: Combined vascular resection was performed more frequently in 3D group than 2D group (36/55 (65.0%) vs 22/63 (34.9%), p = 0.001). Blood loss in 3D group was fewer than 2D group (1300 ml vs 2750 ml, p < 0.001). Blood transfusion rate of RCC in 3D group was lower than 2D group (47% vs 78%, p = 0.001). Morbidity rate of 3D group was lower than 2D group (49% vs 73%, p = 0.008), especially bile leakage was fewer in 3D group than 2D group (9/55 vs 21/63, p = 0.055). The mortality rates were 1.8% (1/55) in 3D group and 9.5% (6/63). Potentially curative resection rate was improved from 63.4% in 2D group to 85.4% in 3D group (p = 0.011) and 5-year overall survival rate of 3D group was better than 2D group (58.0% vs 33.3%, p = 0.029).

Conclusion: 3D-CT was useful and allows preoperative simulation based on accurate information about the relationship between hilar tumor and adjacent vessels, and the branching pattern of hepatic veins. Therefore, blood loss and postoperative morbidity rate can be reduced and might be lead to better long-term survival.

FOS010
USEFULNESS OF MULTI-THREE DIMENSIONAL COMPUTED TOMOGRAMS FUSED WITH MULTI-PLANAR PRECONSTRUCTION IMAGES AND PERORAL CHOLANGIOSCOPIC FINDINGS IN CHOLANGIOCARCINOMA

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Introduction: Multi-planar reconstruction (MPR) images are useful for assessing the degrees of horizontal and vertical extension of cholangiocarcinoma; however, it is difficult to ascertain the range of extensive superficial ductal spread. On the other hands, peroral cholangioscopy (POCS) is used for diagnosing superficial ductal spread and mapping biopsy. With this background, we have developed a novel technique to fuse conventional 3D-CT images with MPR images and peroral cholangioscopy (POCS) findings.

Methods: MPR images were created using the Synapse Vincent volume analyzer (Fujifilm). The range of cancer extension was assessed on MPR images, plotted, and fused onto cholangiographic CT images to create multi-3DCT images. The results of biopsy performed under POCS for assessment of the range of superficial extension of cancer were compared with virtual endoscopic findings and the obtained findings were marked on the multi-3DCT images. A bile duct resection line was designed based on these images. Multi-3DCT images were created for 16 patients with cholangiocarcinoma (hilar cholangiocarcinoma; 7 cases, middle and distal cholangiocarcinoma; 9 cases), and the diagnostic accuracy of longitudinal ductal spread was assessed with pathological findings.

Results: In 11 cases who were performed POCS, extensive superficial ductal spread was found in 4 cases. The location of the tumor was correctly diagnosed in all cases using Multi-3DCT images. In only one of these cases, the cut end of the intrahepatic bile duct was positive, resulting in 87.5% diagnostic accuracy for longitudinal spread, which was significant higher compare with cases diagnosed by only MPR images (accuracy; 68.7%). R0 resection was achieved in 14 cases (87.5%).

Conclusion: The bile duct resection line for cholangiocarcinoma should be designed based on the degree of cancer extension and an understanding of the branching pattern of the bile duct and three-dimensional relationship between the portal vein and arteries. This novel technique using multi-3DCT images was useful for not only understanding

three-dimensional relationship but diagnosing extension of cholangiocarcinoma.

FOS011
PROSPECTIVE RANDOMIZED CONTROLLED TRIAL OF GASTRIC EMPTYING AFTER PYLORUS-PRESERVING PANCREATICODUODENECTOMY: COMPARISON BETWEEN ANTECOLIC AND VERTICAL RETROCOLIC DUODENOJEJUNOSTOMY

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Background: Delayed gastric emptying (DGE) is a worrisome complication after pylorus-preserving pancreaticoduodenectomy (PPPD). The aim of this prospective randomized controlled study was to compare DGE and gastric emptying after PPPD with an antecolic (AC) route and modified retrocolic route, namely vertical retrocolic (VRC) route and to examine the factors affecting DGE.

Methods: Of 165 patients who underwent pancreaticoduodenectomy between 2005 and 2010, 116 patients who were planned to receive PPPD and agreed to the informed consent were randomly divided into the two groups, either the AC (n = 58) or the VRC (n = 58) group. Surgical procedures including the area resected and the extent of lymph node dissection, the length of the duodenum transected from the pylorus ring, pancreaticojejunostomy and hepaticojejunostomy through the right side of the transverse mesocolon were similar between the two groups. Only the final step of duodenojejunostomy was randomized to either the AC or VRC route. DGE was defined as grade A, B and C based on the definition proposed by the ISGPS. Gastric emptying was evaluated by 13C-acetate breath test before and on postoperative day (POD) 14 and 30. The factors influencing DGE were evaluated by the univariate and multivariate analyses.

Results: Clinicopathological and operative factors were similarly distributed between the two groups. DGE was found in 7 (12%) in the AC and 14 (24%) in the VRC group. Clinical DGE (Grade B, C) were observed in 5% in the AC and 10% in the VRC group. No significant difference was observed between the two reconstruction groups. Gastric emptying evaluated by T1/2 (half-emptying time) on POD 14 and 30 was prolonged in both groups in comparison to preoperative levels, but no significant difference was found between the two groups. The factors significantly affected DGE by univariate analysis were body-mass index and pancreatic fistula, but not the reconstruction route. Multivariate analysis revealed that the pancreatic fistula ($p < 0.0005$) was the only factor influencing DGE.

Conclusions: The reconstruction route, AC or VRC, has no significant effect on DGE after PPPD. Postoperative pancreatic fistula is only the factor affecting DGE.

FOS012
TREATMENT STRATEGY OF PT2 GALLBLADDER CARCINOMA: BENEFIT OF HEPATECTOMY BASED ON LONG-TERM OUTCOME

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Introduction: The pT2 gallbladder cancer (GBC) which is the most critical state of GBC in the progression of the disease and the optimal surgical treatment has not yet been analyzed in detail. While most surgeons perform standard regional lymphadenectomy in gallbladder cancer, the clinical indications for hepatectomy in patients with pT2 gallbladder carcinoma remains controversial. The aim of this study is to identify the therapeutic effect of hepatectomy for the surgical treatment of pT2 GBC.

Methods: In the 21 years between January 1995 and November 2009, 163 patients with GBC was diagnosed and underwent a surgical exploration in AJOU university hospital and 73 patients with pT2 GBC who underwent a potentially curative resection were retrospectively analyzed regarding their recurrence rate, recurrence site according to extents of resection. And the patient wad analyzed regarding their pathological finding, surgical procedure, and survival. We investigated clinical features, preoperative diagnoses, preoperative tumor sizes, CA 19-9 level, tumor differentiations, complications, adjuvant therapy.

Results: pT2 GBC was divided hepatectomy group (N = 27) and non-hepatectomy (N = 46) group. On the database the pathological finding of one-stage hepatectomy group have no malignancy in liver specimen. Pathologic finding of eight patients underwent re-resection after incidental GBC was observed no malignant cell even once. There was no significant difference in recurrence site in both group ($P = 0.610$). Hepatic metastasis of pT2 GBC was multiple on both lobe and Gallbladder bed recurrence (S4b, S5) was not noticed so far. The survival rates at 5 years of non-Hepatectomy group were 63% and recurrence occurred in 15 patients (32.61%). The survival rates at 5 years of hepatectomy group were 62.96% and recurrence occurred in 9 patients (29.63%).

Conclusion: Based on above mentioned findings, it is suggested that Hepatectomy (including segmentectomy) showed no benefit for pT2 GBC if negative surgical margin are secured. If it is not confident in R0 resection, wedge resection of gallbladder bed is sufficient for pT2 GBC.

FOS013
IMPROVED SURVIVAL IN AFRICAN AMERICAN MALES WITH INTRAHEPATIC CHOLANGIOCARCINOMA LARGELY DUE TO INCREASED OPERATIVE TREATMENT

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Introduction: Historically, in the US racial inequality has been a major determinant in outcomes secondary to its resultant distrust of the healthcare system and disparages in medical care access. More specifically, African Americans (AA) with intrahepatic cholangiocarcinoma (ICCA) have been reported to have worse survival than other racial groups. Evaluation of the impact of race on treatment and survival in ICCA in the US over the past 20 years was undertaken.
Methods: Mortality and survival rates for Whites, AA (Blacks), and Hispanics with histologically proven ICCA were obtained from the surveillance, epidemiology and end results survey (SEER) database. Comparative subgroup examination of White vs. Black males was also performed.
Results: 2297 patients (White = 2003, Black = 148, Hispanic = 146) had histologically proven ICCA (1989–1998 = 1206, 1999–2008 = 1091). The % of Black males with ICCA remained stable over time (3.2% vs. 3.5%). From 89–98, the only significant difference in Kaplan-Meier survival was found between White and Black males ($p < 0.005$). From 99–08, survival of Black males matched that of White males. No statistically significant differences in survival for any other race or gender from 99–208 were found. In Blacks, the % undergoing surgery is now similar to Whites (18.4% vs. 16%) in contrast to the first time period (5% vs. 11.6%). Substantial decreases for Blacks were seen in: not recommending (72% to 41%), contraindications to (15.4% to 0%), and refusal of surgery (1.4% to 1%).
Conclusion: The survival of Black males with histologically proven ICCA, appears to now be equivalent to White males in the US and due mainly to increased operative treatment. Further, racial inequality seems to be moving toward extinction in regard to the treatment of this disease.

FOS014
NON INVASIVE PATHWAY TO REDUCE NEGATIVE ERCP IN PATIENTS PRESENTED BY OBSTRUCTIVE JAUNDICE WITH GALLSTONES

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Introduction: Common bile duct stones (CBDs) are the most common cause of obstructive jaundice and cholangitis and occurs in about 10%. This study aimed to find non-invasive preoperative tests for predicting CBDs to select patients for preoperative endoscopic retrograde cholangiopancreatography (ERCP) before lap chole (LC). We conducted a prospective preoperative study on 896 patients with symptomatic gall stones who underwent LC at Al Hada military Hospital, Taif, Saudi Arabia from April 2006 to April 2010.
Methods: All patients were subjected to clinical, laboratory (LFT) and ultrasound (US) examination. Patients with normal LFTs and US were referred to LC. Patients with jaundice and US proven CBD abnormality (stones, dilatation >7 mm or both) were referred for ERCP for diagnosis confirmation and stone removal, followed by LC. Patients with jaundice and normal US were referred to magnetic resonance cholangiopancreatography (MRCP). When MRCP detected CBDs, the patients were referred for ERCP for confirmation and stone extraction followed by LC. MRCP and ERCP negative cases were subjected to LC with Intraoperative cholangiography (IOC).
Results: 193/896 (21.5%) were diagnosed to have obstructive jaundice. 102 (52.8%) had normal CBD, the other 91 (47.2%) had CBD abnormalities on US. CBDs were found in 23 (25.3%), dilatated CBD in 28 (30.8%), and 40 (40.3%) had dilated CBD with stones. These 91 patients were referred to ERCP and stones were extracted in 82 (90%). The 102 patients with normal CBD on US were referred to MRCP, 70 (68.6%) were normal by MRCP and were subjected to LC with IOC. CBDs were detected in 2 (2.9%). 32 (31.4%) had stones by MRCP and referred to ERCP which detected CBDs in 25 (78.2%). When CBD was abnormal on US, ERCP detected stones in 90% and when normal it was only 26.5%. MRCP helped avoid un-necessary ERCP in 66.7% with false negative of 1.96% and false positive of 6.7%.
Conclusion: We have documented a considerably higher incidence of obstructive jaundice in our area, one that makes this simple disease a community health issue. Also, with the small number of MRCP machines most hospitals have a long waiting time facility. Therefore, patients with obstructive jaundice and abnormal CBD on US are considered of high risk for CBDs and the use of MRCP is not justified. However, if any of the tests were normal MRCP is indicated to decrease the incidence of negative ERCP.

FOS015
TREATMENT STRATEGY FOR ADVANCED BILIARY CARCINOMAS: A SPECIAL REFERENCE TO ADJUVANT CHEMOTHERAPY AND REPEATED HEPATECTOMY FOR INTRAHEPATIC RECURRENCE

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Introduction: The aim of the present study was to clarify the effectiveness of GEM combined with CDDP and 5FU (GFP) therapy as a adjuvant chemotherapy for advanced biliary carcinomas (BCs), and repeated hepatectomy for intrahepatic reccurence after surgical treatment.
Methods: 1. Adjuvant GFP therapy: The prognostic factors were investigated by multivariate analysis in one hundred patients with BCs before induction of GFP chemotherapy, including intrahepatic cholangiocarcinoma (IHC: n = 33), hilar cholangiocarcinoma (HC: n = 28), and gallbladder cancer (GBC: n = 39). In one hundred thirty-five patients

with BCs (IHC: n = 40, HC: n = 43, GBC: n = 52), patients with poor prognostic factors were received postoperative adjuvant GFP therapy.

2. Validation of repeated hepatectomy: Our indications of repeated hepatectomy as follows; 1) other organ metastasis was not detected and 2) recurrence site was curatively resectable. Five patients with intrahepatic recurrence, who underwent repeated hepatectomy, were included.

Results: 1. R2 resection, LN meta. and intrahepatic meta. were identified as independent prognostic factors. Seventy-nine patients (58.5%) had poor prognostic factors. Of these, 22 patients received adjuvant GFP therapy. Prognosis of patients with poor prognostic factors, who were received adjuvant GFP therapy, was significantly better than those not having adjuvant therapy (3 y: 59.6% vs. 18.9%).

2. Primary sites of these patients were 2 intrahepatic, 2 extrahepatic and 1 gallbladder. Median recurrence free period after first surgery was 2.3 years (0.25–5.96). Repeated hepatectomies were consisted of 1 lobectomy, 3 subsegmentectomies and 1 partial resection. Median overall survival period was 6.2 years (4.1–14.3), and all patients survived.

Conclusion: Postoperative adjuvant GFP therapy for patients with poor prognostic factors and repeated hepatectomy in selected patients may improve the surgical outcomes.

FOS016
MASS-FORMING INTRAHEPATIC CHOLANGIOCARCINOMA WITH MARKED ENHANCEMENT ON ARTERIAL-PHASE COMPUTED TOMOGRAPHY REFLECTS FAVORABLE SURGICAL OUTCOMES

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Introduction: Outcomes after hepatectomy in patients with mass-forming (MF) type intrahepatic cholangiocarcinoma (ICC) with marked enhancement within the tumor on arterial-phase computed tomography (CT) scans have not been clarified in detail.

Methods: We retrospectively studied 140 patients with MF type ICC who underwent hepatectomy from 1989 through 2008. Surgical outcomes were compared between 25 patients with MF type ICC with marked enhancement within the tumor (hypervascular ICC) and 109 patients without enhancement within the tumor (hypovascular ICC) on arterial-phase CT scans.

Results: Portal invasion and intrahepatic metastasis were significantly lower in patients with hypervascular ICC than in those with hypovascular ICC. The 5-year survival rate was significantly higher in patients with hypervascular ICC (86%) than in patients with hypovascular ICC (27%, $p < 0.0001$). Multivariate analysis showed hypervascular ICC on arterial-phase CT scans, normal level of cancer-associated carbohydrate antigen 19-9, absence of portal invasion, and absence of intrahepatic metastasis of ICC to be significant independent prognostic factors for overall survival in patients with MF type ICC.

Conclusion: MF type ICC with marked enhancement within the tumor on arterial CT scans showed a favorable surgical outcome due to its less invasive histopathologic characteristics in patients with MF type ICC.

FOS017
SURGICAL RESULTS OF INTRAHEPATIC BILIARY CYSTIC NEOPLASMS: A SINGLE CENTER EXPERIENCE

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Introduction: Intrahepatic biliary cystic neoplasms, such as biliary cystadenomas and biliary cystadenocarcinomas, are rare hepatic tumors and account for less than 5% of intrahepatic cystic lesions. Accurate preoperative diagnosis is difficult and the outcome differs among various treatment modalities. The aim of this study is to investigate the clinicopathological characteristics of intrahepatic biliary cystic neoplasms and to establish eligible diagnostic and treatment suggestions.

Methods: From December 1986 to November 2011, patients with intrahepatic biliary cystic neoplasms who underwent surgery at Chang Gung Memorial Hospital, Linkou, were retrospectively reviewed. Of them, 19 patients had biliary cystadenoma and one patient had biliary cystadenocarcinoma. Their clinicopathological variables and survival outcome were examined.

Results: Serum and cystic fluid CA 19-9 levels were elevated and the cystic fluid CA 19-9 level was higher than that of serum. Loculation (84.2%) and septation (63.2%) were the most common radiologic findings. 6 (31.58%) patients received preoperative percutaneous biopsy, but the interpretation was inconclusive for diagnosis. 11 (57.9%) patients received complete tumor excision by either enucleation or hepatic resection, while the remaining 8 (42.1%) patients underwent only fenestration of liver cysts. Among patients who had fenestration, 4 (50%) patients had recurrence postoperatively and 3 received additional operations. All patients who received complete tumor excision recovered well after operation and no recurrence was reported at follow-up.

Conclusion: High serum and cystic fluid CA 19-9 levels, together with loculated and septated cystic lesions found on radiologic exams, should raise clinical suspicion of biliary cystadenoma. Preoperative tissue diagnosis by percutaneous biopsy is inconclusive and is not recommended. Surgical fenestration is inadequate and invariably results in persistence or recurrence of disease. The standard treatment is complete tumor excision. The patients can achieve satisfying long-term results once tumor is resected.

FOS018

PATHOLOGIC CHARACTERISTICS OF INTRAHEPATIC, PERI-HILAR AND DISTAL CHOLANGIOCARCINOMA: A RETROSPECTIVE ANALYSIS OF A MULTICENTRIC DATABASE ON 481 RESECTED PATIENTS

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Introduction: To analyze pathologic characteristics among resected patients for cholangiocarcinoma depending on the site of origin (intrahepatic, peri-hilar, and distal).
Methods: A database of 481 resected patients collected from 3 referral Centres (located in Bologna and Verona) was retrospectively reviewed. There were 171 hepatic resections for intrahepatic, 243 for peri-hilar and 67 pancreatoduodenectomy for distal cholangiocarcinoma. Pathological findings such as TNM classification (AJCC 7th edition), R1-R0 resection, lymph node involvement, and tumor differentiation were evaluated.
Results: TNM staging and grade of differentiation were significantly different in the 3 groups. Distal tumors showed a significant higher T stage than others; similarly this group showed a significant higher incidence of lymphnode metastases. G3 grade of differentiation was significantly more frequent in intrahepatic and hilar tumor. Curative resections (R0, 339 patients, 70%) were significantly higher in intrahepatic type (81%), without difference between hilar and distal types. TNM stage, LNs, differentiation and R status were significantly prognostic factors in each group. However, within each category (T1-T2 and T3-T4, N0 and N1, G1-2 and G3, R0 and R1) the survival rates were similar among the 3 groups.
Conclusion: Intrahepatic colangiocarcinoma was usually resected at an earlier stage compared to hilar and distal type which both showed a significant higher rate of R1 resection. Survival rates for corresponding TNM stage, grade of differentiation and radicality among intrahepatic, hilar and distal colangiocarcinoma were similar.

FOS019

OUTCOME OF SURGICAL RESECTION FOR ADVANCED DISTAL BILE DUCT CARCINOMA

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Introduction: The distal bile duct carcinomas (DBCs) are usually in the advanced stage at the time of diagnosis. Although pancreatoduodenectomy (PD) is a golden standard of the treatment, the recurrence rate is still high with a poor prognosis. In this study, we retrospectively reviewed our experiences of resected cases of advanced-DBCs, in terms of clinocopathological features and the outcome.
Methods: PD with D2 lymphadenectomy (dissection of the lymph nodes of the hepatoduodenal ligament) is the standard operative procedure in our department. Between April 2000 and November 2011, a total of 227 PDs for biliary-pancreatic carcinomas (included 75 DBCs) were carried out in our department. Here we focused on the 49 cases of UICC-stage II over advanced-DBCs.
Results: There were 23 males and 26 females with a mean age of 68.7 years of advanced-DBCs. Median operation time was 563.0 min and median operative blood loss was 706.0 ml. Post-operative hospital stay was 42.5 days. There were no operation-related deaths. Clinicopathological findings revealed no significant differences between survival periods for those positive or negative for serosal invasion, hilar infiltration, and pancreatic invasion. Lymph node (LN) metastasis was observed in 19 patients. Median survival periods of patients with positive and negative for LN metastasis were 13.0 and 57.6 months (P = 0.01), respectively. However, the number or localization of LN metastases was not a significant factor. Recurrence rates were: 40.0% (local recurrence), 26.7% (hepatic metastases), 20% (distant metastases), and 13.3% (recurrences in LNs), respectively.
Conclusion: The present study demonstrated that, in advanced-DBCs, there were no significant differences in the median survival periods according to UICC cancer-stages. Surgical resection is crucial matter in cases of advanced-DBCs. Furthermore, since the only adverse prognostic factor in patients who undergo surgical resection is positive of LN metastasis, lymphadenectomies should be performed completely.

FOS020

A NOVEL CLASSIFICATION OF HEPATOLITHIASIS BASED ON THE PATHOLOGICAL CHARACTERISTICS

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Introduction: An optimal classification of hepatolithiasis can not only be helpful in determining treatment strategies but also be simple and easy to apply. However, there is no optimal classification of hepatolithiasis up to now. A novel classification of hepatolithiasis based on clinical and pathological characteristics was introduced in this study.
Methods: Between Jan1976 and Dec 2008, 1951 patients with hepatolithiasis who underwent operation (Hepatectomy or Stones Remove only) were admitted to our institute, of which, 21 (1.1%) patients with a pathologic diagnosis of cholangiocarcinoma associated with intrahepatic stones were excluded, 1930 cases were studied. In the novel classification, hepatolithiasis was divided into two types: Type I and Type II. Type I is a localized stone disease with stones locating in some segments; Type II is a diffuse stone disease, which is divided into three subtypes: Type IIa (without any atrophy or fibrosis of hepatic parenchyma); Type IIb (with segmental atrophy or fibrosis of hepatic parenchyma) and Type IIc (with biliary cirrhosis and portal hypertension).
Results: According to the novel classification, there were 1551 Type I patients (80.4%) and 379 Type II patients (19.6%). There were more patient with cholangitis in Type II than Type I (32.2% vs 47.0%, P < 0.001), and more cases with biliary strictures in Type II than Type I (68.6% vs 58.9%, P = 0.001); 960 cases (61.9%) with Type I had been

underwent hepatectomy, 215 cases (56.7% of Type II) with Type IIb had been underwent hepatectomy (P = 0.065). There were higher immediate stone clearance rates in Type I patients than type II (75.3% vs 54.4%, P < 0.001). Moreover, operative morbidity was lower in type I than type II (12.1% vs 15.8%, P = 0.031).

Conclusion: Hepatectomy is a curative treatment for Type I patients; Type II is a high risk of stone recurrence type, and Type IIb should be performed with hepatectomy combining with Roux-en-Y hepaticojejunostomy or hepaticocutaneous jejunostomy for repairment of biliary strictures.

FOS021
MONOLOBAR CAROLI'S DISEASE IN ADULTS: A SINGLE CENTRE EXPERIENCE OF 14 CASES

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Introduction: Congenital bile ducts dilatation is a rare disorder first described by Caroli et al. in 1958. Common clinical features include lithiasis formation, cholangitis, jaundice, and predisposition to cholangiocarcinoma. Surgical partial hepatic resection can be a definitive treatment option for unilobar forms. We report our single-centre experience of 14 clinical cases, successfully treated by surgical resection.

Methods: A retrospective analysis of 14 patients, operated in our hospital centre between 1991 and 2011, was performed. Demographic features, clinical presentation, biological abnormalities and radiological investigations were analyzed for each patient. Todani's classification was applied on the basis of radiological images, with 12 patients with an intra-hepatic (IH) disease classified as type V, 1 patient as type IVa and 1 patient as type I, having a dilatation of the common bile duct (CBD). Surgical intervention was classified according to the Brisbane 2000 terminology. Postoperatives complications were classified according to Clavien's classification between type I and IIIa. A minimal follow-up of five months up to 10 years was performed.

Results: We treated only monolobar disease with 0% of mortality. Left side involvement was found in 76% of cases. Eight patients presented with cholangitis; the average delay between symptoms and operation was 21 months (range 2–84). Eleven patients had previous treatments by ERCP and/or cholecystectomy. Left hemihepatectomy was the most performed operation, followed by 3 segmentectomies, 3 bisegmentectomies and one CBD resection. Eleven patients had another surgical procedure associated (8 cholecystectomy, 3 CBD explorations, 4 biliodigestive reconstructions (BDR), 3 controlateral biopsies and one kystic marsupialisation). Ten of the 12 patients did not present any recourrence. Only 1 case of cholangiocarcinoma was found, 10 years after BDR.

Conclusion: Liver resection is the treatment of choice for monolobar Caroli's disease. Although a rare disease, it should be considered in differential diagnosis of cholangitis of incertain origin.

FOS022
STRAIGHTFORWARD ANTERIOR HEPATIC TRANSECTION DURING LEFT HEPATECTOMY AND CAUDATE LOBE RESECTION FOR HILAR BILE DUCT CANCER

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Introduction: The liver hanging maneuver (LHM) is a useful technique enabling a safe anterior approach, but it has several technical limitations for resection of the hepatic paracaval portion. We had presented a modified LHM that facilitates concurrent resection of the paracaval portion, a technique applicable to left liver resection for hilar bile duct (HBD) cancers. However, after accumulation of experience, straightforward anterior resection appeared more feasible without using any type of LHM.

Methods: During 2010 and 2011, 10 HBD cancer patients underwent left liver resection, with intentional omission of LHM. This method included straightforward anterior transection to the caudal paracaval portion. The parenchyma transection plane was tailored to remove most of the paracaval portion.

Results: In this revised technique, liver transection was totally approached from the right side, with no touch to the left side. After parenchymal transection, the left liver was mobilized and removed. This modification resulted in shortening of operation time by 30 minutes and omission of painstaking retrohepatic tunneling. The final parenchymal transection plane was the same as that following conventional surgical technique for HBD cancers.

Conclusion: In conclusion, we think that this straightforward anterior transection method is as effective as using modified LHM and technically simpler procedure for resection of the left liver and caudate lobe in HBD patients.

FOS023
FACTORS AFFECTING SURGICAL OUTCOME OF BENIGN BILE DUCT STRICTURE – SINGLE CENTE EXPERIENCE

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Introduction: Bile duct strictures have a varied etiology. Those arising as a result of iatrogenic injury at the time of cholecystectomy are of special interest to surgeons. The option for surgical repair of these bile duct stricture consists of lowering of the hilar plate followed by roux-en-y hepaticojejunostomy. The ability to predict both, outcome of these repairs and prevention of those factors that lead to poorer outcome are important strategies in their long term management.

Methods: Records of patients who underwent repair of benign biliary stricture from 2003 to 2011 were retrospectively reviewed with reference to etiology, level of

involvement, hospital course and outcome. Only strictures arising secondary to a cholecystectomy done for benign disease were included. Follow-up was documented by review of outpatient records and mail/phone interviews. The stricture was classified based on operative findings using the Bismuth classification. Preoperative diagnosis was done by Magnetic resonance imaging. Most patients underwent a repair using a roux-en-y hepaticojeunostomy. Nearly all had a radiological access loop created with the distal loop of jejunum. Outcome was analysed depending on need for further intervention.

Results: 183 patients were diagnosed with benign bile duct strictures. Of which 125 were a result of iatrogenic injury during cholecystectomy (60 open and 65 laparoscopic cholecystectomy). Majority (53%) presented one year after injury. 12/125 patients (9.6%) had type IV and 5/125 (4%) had type V stricture. 9 patients had secondary biliary cirrhosis.

Following repair, 10/122 required additional procedures including re-operation and access loop dilatation (9 of these10 had type III and IV stricture). Perioperative mortality was (3/125) 2.4%, all had secondary biliary cirrhosis at the time of repair (2 with type IV and 1 with Type III stricture). One additional death occurred at 3 year followup, due to decompensation from secondary biliary cirrhosis.

Conclusion: A surgical repair of the stricture produced good results for majority of patients without the need for ongoing intervention. Outcome depended mainly on the level of bile duct injury and secondary biliary cirrhosis. Redo of hepaticojejunostomy and avoiding delay in treatment beyond the duration for control of local sepsis will prevent parenchymal injury. Radiological jejunal access loop is a relatively safe method for surveillance of these anastomosis and dilatation, when required.

FOS024
THERAPEUTIC EFFECT OF LAPAROSCOPIC CHOLECYSTECTOMY PERFORMED AT DIFFERENT TIME AFTER PERCUTANEOUS TRANSHEPATIC GALLBLADDER DRAINAGE FOR PATIENTS WITH SEVERE ACUTE CHOLECYSTITIS

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Introduction: Percutaneous transhepatic gallbladder drainage (PTGD) is an effective technique for severe acute cholecystitis, which can decompress the swollen gallbladder and lead to patients' early recovery. It may decrease the technical difficulty of laparoscopic cholecystectomy (LC) and facilitate successful surgery when the patients' condition improves. However, the optimal time of LC after PTGD remains controversial.

Methods: From 2004 to 2011, LC after PTGD was performed in 107 patients with severe acute cholecystitis. All patients were divided into two Groups. Group I members underwent LC within 2 weeks after PTGD (n = 42), whereas Group II members underwent LC at more than 3 weeks after PTGD (n = 65). The therapeutic effect, frequency of postoperative complications, rate of conversion to open laparotomy and length of postoperative hospital stay.

Results: PTGD were successfully performed on all patients in two groups. Mean time intervals to LC after PTGD were 8.79 ± 2.25 d and 29.34 ± 6.29 d respectively. No operative death happened during LC in two groups. The conservation rate of LC in Group I was higher than in Group II with significant difference (19.0% vs. 4.6%, $p < 0.05$). Mean operative time in group I was greater than in group II (76.07 ± 29.17 min vs. 57.05 ± 14.28 min; $p < 0.05$). Postoperative complication rate of LC in Group I was more than in Group II with significant difference (11.9% vs. 1.5%; $p < 0.05$). The acute/chronic ratio of those two groups determined by pathologic diagnosis were 35/7 (Group I) and 3/62 (Group II). Hospital stay was not significant difference between two groups ($p > 0.05$).

Conclusion: LC performed at least more than 3 weeks after PTGD for patients with severe acute cholecystitis is more safe than within 2 weeks after PTGD because of its lower difficulty, lower conversion rate and lower complication rate.

FOS025
LAPAROSCOPIC 'RADICAL' CHOLECYSTECTOMY: A SAFE STRATEGY FOR POTENTIALLY MALIGNANT GALLBLADDER LESIONS

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Introduction: Potentially malignant gallbladder (GB) lesions are frequently diagnosed. Laparoscopic cholecystectomy (LC) is recommended for polyps >10 mm in diameter, fast-growing, sessile or arise from the GB neck or abnormal GB wall ultrasound findings. GB cancer is found in >10% of the cases when LC is performed for these indications, where a simple LC may not be oncologically adequate. With the expansion of laparoscopic liver surgery a minimally invasive strategy to avoid R1/R2 resections can be proposed.

Methods: A retrospective review of all patients who had laparoscopic radical cholecystectomy (LRC) for potentially malignant GB lesions; on radiological imaging, in a university teaching hospital between August 2006 and February 2011. LRC was defined as laparoscopic en bloc GB and liver bed resection (5–30 mm layer of surrounding liver parenchyma in segments IVb and V) with the cystic node and the cystic duct; divided flush to the common bile duct (CBD). The specimen was sent then to frozen section (FS) and the results determined whether further liver, CBD resection or total lymphadenectomy were performed.

Results: Thirty patients had LRC. Median operating time was 117.5 (60–390) ins. Median blood loss was 50 (0–500) L. Median hospital stay was 2 (1–14) days. Three conversions were recorded; one patient was found to have high grade dysplasia with possible cancer and a positive node on FS and therefore had open completion lymphadenectomy and two due to technical difficulties in patients with benign histology. Histology revealed chronic cholecystitis (n = 16), xanthogranulomatous pseudo-tumor (n = 3), adenomyoma-

tosis (n = 3), adenocarcimoa (n = 3), benign porcelain GB (n = 1), normal features (n = 1), villous adenoma (n = 1), metastatic renal cell carcinoma (n = 1) and low-grade dysplasia (n = 1). All resections were R0. 4 complications were observed with no mortality.

Conclusion: LRC is a safe and valid minimally invasive strategy for the management of patients with potentially malignant GB pathology. It offers an initial minimally invasive approach as opposed to starting with an open procedure which can also be unnecessary. It permits full staging and complete resection in one setting removing the need for a second open operation. In case of malignancy; it prevents the risk of incomplete resection, seeding and port site metastasis.

FOS026
USE OF CT ANGIOGRAPHY TO DIAGNOSE ASSOCIATED VASCULAR INJURIES IN PATIENTS WITH COMMON BILE DUCT INJURIES FOLLOWING CHOLECYSTECTOMY

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Introduction: Laparoscopic cholecystectomy has become an exceedingly common procedure with a low incidence of morbidity and mortality. Injury to the common bile duct has long been recognized as the most debilitating of these complications. Previously poorly appreciated, there is an emerging literature regarding the alarming frequency of concomitant vascular injury.

Methods: This is a retrospective analysis of 42 patients from our institution, a high-volume, multidisciplinary hepato-pancreato-biliary center. All patients were referred from other hospitals in southern California for a higher level of care. Patients were evaluated using percutaneous cholangiography and/or endoscopic retrograde cholangiopancreatography (ERCP), as well as a dual-phase CT scan of the abdomen plus/minus selective angiography. The imaging studies were reviewed in a blinded fashion by two senior radiologists at our institution.

Results: 42 patients suffered biliary complications after cholecystectomy. 14 were identified with vascular injuries. The affected vessels included the right hepatic artery (RHA), the portal vein, and mixed injuries. We began using CT angiography 2.5 years ago due to concern for vascular injury. 9 of 42 patients had both a dual-phase CT scan and selective angiography, and 4 of 9 were found to have vascular injuries. 3 of 4 were identified by CT using criteria of perfusion differences between the right and left liver and non-visualization of a vessel. In the 4th patient, the injury was not initially identified, but perfusion disparity and non-visualization of the RHA were identified during re-review. All injuries were confirmed by angiography.

Conclusion: There should be a high index of suspicion for vascular injury in patients who suffer biliary injury as after cholecystectomy. Patients should undergo CT angiography of the abdomen as part of the initial/pre-operative evaluation. Key findings include perfusion abnormalities and differences in enhancement of the liver, and non-visualization or abrupt cut-offs of the hepatic artery and/or portal vein. Selective angiography should be used in cases where the findings are uncertain or equivocal.

FOS027
ANALYSIS OF ENDOSCOPIC RETROGRADE PANCREATOGRAPHIC (ERCP) MANAGEMENT OF COMMON BILE DUCT STONES IN THE LAPAROSCOPIC ERA

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Background: Common bile duct stones (CBDS) occur commonly in gallstone disease. In the UK, management trends are to perform laparoscopic cholecystectomy and endoscopic retrograde cholangiopancreatography (ERCP) separately, necessitating co-operation of surgical and gastroenterological specialists. The 2008 British Society of Gastroenterology (BSG) guidelines state that 90% of CBDS can be successfully treated endoscopically. We investigated whether these targets were commonly attained in routine practice.

Methods: The records of ERCPs performed in our regional hospitals between January 2006 and April 2011 were retrospectively interrogated in the NHS Unisoft database system. All patients who underwent ERCP regardless of concomitant surgical intervention were included. Those patients who presented with CBDS were specifically identified, together with an analysis of the number of procedures they underwent to achieve duct clearance, and whether common bile duct stents were placed. CBDS was classified at ERCP as either directly visualised stones, features identified suggestive of stone passage, the presence of biliary sludge or pre-procedural imaging confirming CBDS (MRCP, CT, AUSS) with no stones seen on ERCP.

Results: 1229 patients were identified, of whom 736 underwent ERCP for CBDS. In those, stones were directly visualised on ERCP in 539 cases with the remaining 197 showing the presence of biliary sludge or evidence of passed stones. Of the 539 patients, 390 patients had successful stone removal on first ERCP (72.2%), whereas 149 patients (27.6%) required repeated ERCPs and placement of CBD stents. Of these 149 patients, 124 eventually had successful CBDS clearance (median of 2 ERCPs: range 1–12). However, 25/149 patients proceeded to surgical exploration of the CBD following unsuccessful first ERCP. Overall, endoscopic CBDS clearance was achieved in 95.4% (514/539), though 23% (124/514) of the cases required two or more ERCPs.

Conclusions: The rate of eventual CBDS clearance of our practice is consistent with the BSG guidelines. The proportion of patients requiring repeated ERCP remains significant. Therapeutic ERCP is gaining in popularity but carries specific complication hazards which are not inconsiderable. With improving laparoscopic techniques, it may be appropriate to consider early referral for laparoscopic bile duct exploration following inability to clear the CBD following ERCP. (*Equal contributors)

FOS028

FLUORESCENT CHOLANGIOGRAPHY. A SAFE AND EASY METHOD TO DIMINISH THE RISK OF BILIARY INJURIES

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Introduction: The surgical lession of the bile duct reach the 0.4%. It can be serious and in cases hepatic transplant is necessary. The accurate anatomic identification of the bile duct can prevent the lession or its identification during the intra-operative. The traditional intra-operative radioscopic cholangiography is frequently used and may prevent the severity of the lesion when it is interpreted correctly.

However, it would be very useful to have an imaging method that show in real time.

Methods: The study was approved by the ethics committees of the Anchorena Hospital and the Medical University of Buenos Aires. Informed consent was obtained from all patients undergoing Laparoscopic cholecistectomy for symptomatic gallbladder lythiasis between June 2011 and November 2011.

Administration Of The Fluorescent Dye: Considering that the ICG is excreted into the bile within minutes after intravenous injection, reaching a maximum within 2 hours, we administrated the dye one our before surgery in a dose of 0.05 mg/kg.

During the cholecistectomy we alternate the exposure of the biliary structures to xenon and infrared light and evaluate the identification of the biliary structures before dissection.

Results: Fluorescent cholangiography delineated common bile duct and the cyst duct in all 65 patients. In 47 we identified the gallbladder with fluorescence before dissection. In 60 patients the hepatic ducts were visualized. Three accesory bile ducts were found in three patients with the fluorescence vision. There was no complication related to the technique.

Conclusion: The fluoroscopic cholangiography with indocyanine green proved to be a sensible and reliable method for the real-time detection of the anatomic structures of the extra hepatic bile duct without requiring the catheterization of the bile duct. This facilitated the laparoscopic cholecystechtomy performance providing greater accuracy in the interpretation of the common bile duct and cystic duct.

FOS029

EVALUATION OF CLINICAL VALUE OF CONCOMITANT PORTAL VEIN RESECTION FOR ADVANCED GALLBLADDER CARCINOMA

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Introduction: Recently, we reported clinical value of surgical resection for advanced gallbladder carcinoma involving the extrahepatic bile duct. For locally advanced gallbladder carcinoma which required concomitant portal vein resection (PVR), we have aggressively performed surgical resection. The aim of this study is to evaluate clinical value of PVR for advanced gallbladder carcinoma.

Methods: From 2000 to 2010, 127 consecutive patients with gallbladder carcinoma underwent surgical resection. Of them, 30 (24%) underwent PVR to obtain complete resection. Two patients who had synchronous biliary malignant disease were excluded from this study. The remaining 28 patients formed the cohort of the present study. Their medical records were retrospectively reviewed.

Results: Pancreatoduodenectomy (PD), gallbladder bed resection (GB) plus extrahepatic bile duct resection (EBD), GB plus PD, major hepatectomy (MH) plus EBD, and MH plus PD (HPD) were performed in 1, 1, 4, 14, and 8 patients, respectively. Histologically, 19 patients had regional lymph node metastasis (N), 4 had periaortic lymph node metastasis (PA-N), and 3 had distant metastasis other than PA-N (M). R0 resection was achieved in 20 (71%) patients. Five patients died of postoperative complications, and 3 of the 5 patients underwent HPD. The 5-year survival for the 23 patients who tolerated surgery was 33%; actually, 3 patients survived more than 5 years. There were no 5-year survivors in the patients who underwent HPD.

Conclusion: There were only a few long-term survivors in patients with locally advanced gallbladder carcinoma who underwent combined PVR. Surgical indication of HPD with PVR should be carefully considered.

FOS030

ROLE OF RESECTION FOR BISMUTH TYPE IV KLATSKIN TUMOR AND ANALYSIS OF DETERMINING FACTORS FOR CURATIVE RESECTION

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Introduction: Surgical resection has been the mainstay of curative treatment for extrahepatic bile duct cancers. In the past, Bismuth type IV hilar cholangiocarcinomas had been considered unresectable. However, extended liver resection provides long-term survival in selected patients with Bismuth type IV hilar cholangiocarcinomas. This study was intended to evaluate the role of resection for Bismuth type IV Klatskin tumors and to explore the determining factors for curative resection.

Methods: Forty of 159 patients with Bismuth type IV hilar cholangiocarcinoma underwent surgical resection between 2000 and 2010 at Seoul National University Hospital. Among them, 33 patients (82.5%) had curative-intended major hepatic resection (CIR). Mean age of the patients with CIR was 60.1 years. Male to female ratio was 1.75 to 1. Preoperative portal vein embolization was conducted in 10 patients. The type of operation included right-sided hepatectomy (n = 16, 48.5%) and left-sided hepatectomy (n = 17, 51.5%). R0 resection rate was 63.6%. Clinicopatholgical features and survival were investigated and disease extent and anatomical variations were analyzed to explore the factors which enable curative resection in Bismuth type IV Klatskin tumor.

Results: The rate of CIR with hilar trifurcation bile duct variation (BDV) was significant higher than that with other type of BDV (39.4% vs. 14.4%; $p < 0.001$). The length of left 2nd confluence and the tumor infiltration into left bile duct of right-sided CIR was shorter than that of left-sided CIR (10.8 ± 4.9, 2.7 ± 0.8 vs. 16.5 ± 8.4, 7.0 ± 5.3 mm, $p = 0.029$). Patients undergoing left-sided CIR had higher proportion of tumors invading less than 5 mm over the right 2nd confluence than those undergoing right-sided CIR (76.9% vs. 40%; $p = 0.067$). The survival rates after CIR was significantly higher than those after non-CIR (3YSR 28 vs. 0%, $p = 0.006$). Adjuvant radiotherapy was single significant prognostic factor (median survival 23 vs. 12 months, $p = 0.042$).
Conclusion: Hilar trifurcation BDV, the length of contralateral 2nd confluence and the tumor infiltration over 2nd confluence of right-or left-dominant Bismuth type IV Klatskin tumor were important for CIR. Carefully selected patients with Bismuth type IV Klatskin tumor can be candidate for CIR with expected prolonged survival.

FOS031
INCIDENCE AND CLINICAL IMPACT OF OCCULT PANCREATICOBILIARY REFLUX IN HEALTHY ADULT

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Introduction: The reflux of pancreatic enzymes into the biliary tract has been associated with inflammation and increased cellular proliferation of the biliary epithelium, leading to biliary carcinoma. The reflux of pancreatic enzyme into the biliary tract can be caused by pancreaticobiliary maljunction or sphincter of Oddi dysfunction, but this kind of study is limited. The aim of this study is for detecting the incidence of occult pancreaticobiliary reflux in patients who underwent laparoscopic cholecystectomy.
Methods: From December 2010 to March 2011, 47 patients with symptomatic gallstone who underwent laparoscopic cholecystectomy and gallbladder bile samples were obtained from the specimen of were recruited for this study. Patients with preoperative ERCP and PTGBD were excluded. The amylase level in the bile was measured. Patients were categorized into Group A, as those who had higher level of amylase in bile acid than in blood serum, and Group B, as those who did not. The immunohistochemistry of p53, SMAD4 and Ki-67 were performed for detecting metaplasia and dysplasia.
Results: Biliary amylase was measured higher than blood serum amylase in 10 patients (Group A: 127.5~109444 U/mL, Group B: 0–54.4 U/mL). Mean age was 67.2 in group A and 51.2 in group B ($p < 0.01$). The ratio of gender was 3 : 7 in group A and 17 : 20 in group B ($p = 0.297$). Three cases of metaplasia were found in group A and 17 cases in group B ($p = 0.474$). Eight patients had inflammation in group A, and 13 patients in group B ($p = 0.014$). There were 6 patients with positivity in p53 in group A, and 12 patients with positivity in group B ($p = 0.111$). The numbers of patients with loss of SMAD4 were 6 in group A and 5 in group B ($p = 0.333$), and the numbers of patients with positive Ki-67 test were 5 in group A and 5 in group B ($p = 0.024$).
Conclusion: The incidence of pancreaticobiliary reflux of pancreatic enzymes from occult pancreaticobiliary reflux was increased with ages, and so did the incidence of inflammation. And it might be suggested that the reflux can cause the process to dysplasia due to the high positive ratio in Ki65 test. The clinical consideration of pancreaticobilicary reflux from the malfunction of the sphincter of Oddi might be needed. Therefore, in patients with suspected OPBR, close follow up will be required.

FOS032
ODDI SPHINCTER PRESERVING HILAR CHOLANGIOPLASTY, A NEW PROCEDURE TO TREAT HEPATOLITHIASIS

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Introduction: Hepatolithiasis (HL) is common in China. If the intrahepatic foci (stones and bile duct strictures) were limited to a few segments, the foci can be eliminated by Simple Segmental Hepatectomy (SSH). The Cholangitis Recurrence Rate (CRR) of SSH is $25 \pm$ %. However, about 40% of HL patients, the foci are too widely spread to be eliminated by SSH. Such cases are traditionally managed with CholedochoEnterostomy (CE). The CRR of CE is 50%~70%. In order to improve the outcome, we designed this procedure.
Methods: Oddi Sphincter Preserving Hilar CholangioPlasty (SPHCP): Extend the incision on the choledochus upward to the right and left secondary or tertiary hepatic ducts. Incise all strictures and retrieve all stones encountered. Prepare a jejunum loop (12 cm~15 cm) with a vasal pedicel. Anastomose its rectal end to the biliary stoma to correct the stenosis. Close its oral end; embed it subcutaneously to form a permanent tunnel from abdominal wall to biliary tract. If the gallbladder remains in situ, use it instead of jejunum.

Patient Assignment: SSH: for limited foci; CE: for widely spread foci and Oddi sphincter already narrowed or bypassed; SPHCP: for widely spread foci and intact Oddi sphincter allowing a F-16# sound to pass through.
Results: From February of 1993 to December of 2006, 23 patients were treated with SSH, 24 with CE, and 82 with SPHCP; in total 129. Out of them, 115 (89.1%) were followed up for 1 to 174 months (median = 71 months): 17 (73.9%) in SSH; 18 (75.0%) in CE; 80 (97.6%) in SPHCP.

The Cumulative Probability of Postoperative Cholangitis (CuPPC) was estimated and compared using survival analysis. By 50 months postoperatively, the CuPPC of SSH, CE and SPHCP were 16%, 49%, and 19% respectively. By 100 months postoperatively, the CuPPC were 16%, 74%, and 22% respectively. The CuPPC was lower in group SPHCP than in CE. Log-rank χ^2 test between SPHCP and CE shows $\chi^2 = 7.288$, $P = 0.007$; between SPCP and SSH, $\chi^2 = 0.277$, $P = 0.599$; between CE and SSH, $\chi^2 = 4.484$, $P = 0.034$.
Conclusion: The CuPPC after SPHCP is much lower than after CE. This is due to the preserved function of Oddi sphincter and the tunnel established between abdominal wall and biliary tract. The former prevents entero-biliary reflux, the most important trigger of cholangitis. The latter provides a permanent access allowing easy retrieval of residual/recurrent stones, a predisposing factor of recurrent cholangitis.

When intrahepatic foci cannot be eliminated, SPHCP is superior to CE after SSH or lithotomy.

FOS033
CLINICOPATHOLOGICAL FEATURES AND PROGNOSIS OF MUCIN-PRODUCING BILE DUCT TUMOR AND MUCINOUS CYSTIC TUMOR OF THE LIVER: A MULTI-INSTITUTIONAL STUDY OF THE JAPAN BILIARY ASSOCIATION

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Introduction: Mucinous cystic neoplasm of the liver (MCN) is a controversial entity regarding differentiation from mucin-producing intraductal papillary neoplasm of the intrahepatic bile duct (IPNB). The WHO classification defined MCN as a cyst-forming epithelial neoplasm composed of mucin-producing epithelium and associated with ovarian-like stroma. In order to clarify the clinicopathological features of MCN and IPNB, multi-institutional study was performed by Japan Biliary Association (JBA).
Methods: We performed a multi-institutional, retrospective study on patients with MCN or IPNB. Final diagnosis of MCN was made on the basis of the presence of ovarian-like stroma. Clinicopathological features and prognosis were investigated.
Results: A total of 194 cases (IPNB; 146, MCN; 48) were collected from 35 institutes. Pathological examination was done in 128 cases (IPNB; 97, MCN; 31). Ovarian-like stroma was confirmed in 7 females of 31 cases with an institutional diagnosis of MCN and a total of 121 cases (74 males and 47 females) were diagnosed as IPNB. IPNB vs MCN: mean age; 65 vs 61 years, cancer; 75 vs 1 cases, non-cancer lesion; 46 vs 6 cases, symptoms; abdominal pain, liver dysfunction, jaundice, mucobilia vs abdominal pain, size of lesion; 38 × 22 vs 45 × 35 mm, size of protruding lesion; 22 × 16 vs 23 × 17 mm, ALT; 57 vs 20 U/l ($p < 0.05$ -GTP; 212 vs 98 U/l ($p < 0.05$), 5-year survival rate; IPNB cancer 82% vs 100%. IPNB and MCN were predominantly found in the left lobe.
Conclusion: MCN with ovarian-like stroma is a rare tumor only found in females, while IPNB develops more frequently in males. The main symptoms of IPNB included abdominal pain, liver dysfunction and mucobilia with significant increases of ALT and -GTP, while that of MCN was abdominal pain. The cystic lesion tended to be bigger in MCN than in IPNB. Both tumors showed good prognosis when resected completely.

FOS034
SURGICAL TREATMENT FOR RECURRENT BILIARY TRACT CANCER

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Introduction: The complete surgical removal of biliary tract cancer including cholangiocarcinoma (perihilar, distal, intrahepatic) and gallbladder carcinoma, offers the only chance of cure. Long-term survival, however, is very limited because of frequent recurrence, and surgical indication for recurrence is still debatable. The aim of this study was to assess the efficacy of resection in selected patients with recurrent biliary tract cancer.
Methods: Between 1975 and 2010, 1139 consecutive patients with biliary tract cancer underwent resection with curative intent. Of these, 75 patients underwent resection of recurrent disease.
Results: A total of 94 resections for recurrence were performed in 75 patients and various types of resection were applied, including from tumor resection to major hepatectomy. The mean time between initial surgery and resection for recurrence was 22.6 months (range, 1.4–119.5 months). The site of recurrence presented chest or abdominal wall including seeding of percutaneous transhepatic biliary drainage tract in 29 patients (39%), liver in 16 patients (22%), locoregional recurrence in 10 patients (13%), lymph nodes in 10 patients (13%), and others in 10 patients (13%). The overall 3-year survival rates after recurrence was 26.4%, and 15 patients survived for more than 3 years after recurrence.
Conclusion: Our results demonstrate that repeated resection for recurrence is feasible and can offer prolonged survival in selected patients with biliary tract cancer recurrence.

FOS035
CHOLANGIOCARCINOMA: ARE NORTH AMERICAN SURGICAL OUTCOMES OPTIMAL?

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Introduction: Cholangiocarcinomas are deadly, and their surgical management requires complex decisions. Some referral centers have reported good results, but no robust, risk-adjusted operative outcome data are available. Therefore, the aims of this study were to analyze the surgical outcomes of a very large North American cohort of patients undergoing operations for intrahepatic, perihilar and distal cholangiocarcinoma.
Methods: The American College of Surgeons – National Surgical Quality Improvement Program Participant Use File was queried for patients with bile duct cancers. Patients (N = 844) were classified as having intrahepatic (36%), perihilar (35%) or distal (29%) cholangiocarcinomas by the type of procedure performed. Operations were grouped into four categories: hepatectomy, bile duct resection (BDR), hepatectomy plus BDR or pancreatoduodenectomy. Observed (O) and expected (E) mortality and O/E ratios were determined.

Results: The mean age was 64.4 years; 59% were men; and 72% were ASA Class 3 or 4.
Surgical outcomes were:
Intrahepatic/Hepatectomy (N = 305): mortality = 5.2%, mortality O/E = 2.36, morbidity = 29.2%.
Perihilar/BDR (N = 150): mortality = 6.1%, mortality O/E = 1.36, morbidity = 42.2%.
Perihilar/BDR + Hepatectomy (N = 146): mortality = 11.9%, mortality O/E = 2.90, morbidity = 57.3%.
Distal/Pancreatoduodenectomy (N = 243): mortality = 1.2%, mortality O/E = 0.35, morbidity = 46.5%.
All Patients (N = 844): mortality = 5.5%, mortality O/E = 1.67, morbidity = 41.1%.
Mortality and O/E ratios were highest for perihilar tumors that were managed with BDR and hepatectomy. Frequent major complications included sepsis (13.9%) organ space infection (13.5%), and reoperation (8.6%).
Conclusion: This analysis suggests that a) outcomes are best for distal and worst for perihilar cholangiocarcinomas, b) hepatectomy for bile duct cancers is associated with a 2–3 fold mortality risk and c) less than half of perihilar tumors are managed with a hepatectomy. We conclude that in North America outcomes for patients with proximal cholangiocarcinomas can be improved. We suggest that further regionalization into higher volume centers will be required to optimize outcomes.

FOS036
THE PROGNOSTIC FACTORS AFTER CURATIVE RESECTION IN DISTAL COMMON BILE DUCT CANCER; FOCUSING ON THE SIGNIFICANCE OF PERINEURAL INVASION AND LYMPHOVASCULAR INVASION

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Introduction: Recently perineural invasion (PNI) and lymphovascular invasion (LVI) have been known to be important prognostic factors in peripheral cholangiocarcinoma and hilar cholangiocarcinoma, but, in distal common bile duct cancer (distal CBD Ca) it is not clear until now. The purpose of this study was to evaluate the factors that influence recurrence and long-term survival and especially the significance of PNI and LVI as the prognostic factor after curative resection (R0) of distal CBD Ca.
Methods: We examined the patients with distal CBD Ca who underwent radical surgery at Chonnam National University Hospital between March 2006 and June 2010. Retrospective analysis was performed for 64 patients of distal CBD Ca with R0 resection confirmed by pathologic results. We examined clinicopathologic features, recurrence and survival rate, and evaluated the prognostic factors affecting survival. Survival curves were analyzed using the Kaplan-Meier method, and for the evaluation of prognostic factors, log-rank test was used for univariate analysis and Cox proportional hazards model was used for multivariate analysis. A p-value <0.05 was considered to be statistically significant.
Results: Overall survival rates for 1, 3, and 5 years were 78%, 43%, and 35% respectively. In the univariate analysis, the prognostic factors influencing survival were histologic differentiation, lymph node metastasis, and TNM stage. Among them, lymph node metastasis was identified to be only independent prognostic factor for overall survival in multivariate analysis. As for the PNI, the 5-year survival rate is higher in PNI-negative group than in PNI-positive group, but there was no statistical significace. And also the LVI was not significantly associated with long-term survival.
Conclusion: Lymph node metastasis was only significant prognostic factor affecting survival after curative resection of distal CBD Ca. As for the PNI and LVI those are recently thought to be significant prognositic factors in cholangiocarcinoma, our study did not show any significant relationship with long-term survival after curative (R0) resection of distal CBD Ca. We think that further larger scaled studies should be necessary to identify the prognostic significance of PNI and LVI in distal CBD Ca.

FOS037
INCIDENCE OF CONCOMITANT HEPATIC ARTERY INJURY IN PATIENTS WITH IATROGENIC BILE DUCT INJURIES RECONSTRUCTED WITH HEPATICO-JEJUNOSTOMY: A NATIONWIDE STUDY

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Introduction: Iatrogenic bile duct injuries (BDI) sustained during cholecystectomy are associated with severe short and long term morbidity and even mortality. The impact of concomitant hepatic artery injury (HAI) on morbidity and the long term reconstruction result has been debated. Likewise there is a large variation (12–47%) in the reported incidence of concomitant HAI in selected series. This study was conducted to elucidate the incidence of concomitant HAI in a nationwide population of BDIs.
Methods: All patients undergoing hepatico-jejunostomy (HJ) reconstruction after iatrogenic BDI sustained during cholecystectomy between January 1995 and January 2010 were retrospectively identified in local and national registers associated with the five hepatopancreaticobiliary (HPB) centers in Denmark. Patient charts were reviewed for evidence of concomitant HAI. No specific investigations were performed to reveal concomitant vascular injury in addition to the surgeons' observations during the reconstructive surgery.
Results: 139 patients with BDI reconstructed with HJ were identified. A concomitant HAI was reported in 26 cases (19%). Twenty-four of these were injuries to the right hepatic artery (RHA) and 2 suffered a complete transection of the

common hepatic artery. No cases of damage to the portal vein were observed. The incidence of observed concomitant vascular injury ranged from 0% to 37%. The incidences of HAI described in the 5 centers were 0, 6, 37, 25 and 19%, respectively. This difference of described incidence between the five HPB centers was significant (p = 0.03).

Conclusion: In this nationwide retrospective study covering 15 years BDI, concomitant HAI was described in 19% of the patients reconstructed with HJ after BDI. RHA injury accounted for the majority of cases. This incidence is most likely underestimated. To obtain the true incidence of HAI would require a prospective and CT angiography and intraoperative Doppler ultrasound controlled study.

FOS038
IS THE PREOPERATIVE LEVEL OF TOTAL BILIRUBIN IN THE BILE FROM A PREDICTED REMNANT LIVER USEFUL FOR THE PREDICTION OF POSTOPERATIVE LIVER FAILURE IN MAJOR HEPATECTOMY IN PATIENTS WITH OBSTRUCTIVE JAUNDICE?

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Introduction: In recent years, hepatectomy has been safely performed because of a progression in surgical procedures and the establishment of liver function assessment. However, the correct evaluation of a functional liver reserve is sometimes difficult in patients with obstructive jaundice. This study examined whether the preoperative level of total bilirubin in the bile from a predicted remnant liver (LTB) can be used as a predictor for postoperative liver failure (PLF) in these patients.

Methods: Forty patients with obstructive jaundice who underwent right or more extended hepatectomy were enrolled in the study. All of the bile from the future remnant liver was collected for analysis. The LTB was calculated by multiplying the volume (dl) and the density (mg/dl) of the bile from the future remnant liver. PLF was defined as the total bile (T-Bil) increasing postoperatively to over 10 mg/dl.

Results: The surgical procedure was right hepatectomy with caudate lobectomy in 35 (85%) patients, right trisegmentectomy with caudate lobectomy in 5 (15%), reconstruction of the portal vein in 14, and reconstruction of the hepatic artery in 2. According to a univariate analysis, the LTB (P = 0.0015), operative time (P = 0.0088), intraoperative bleeding (P = 0.0069), and blood transfusion (P = 0.0040) were significant. Multivariate analysis showed LTB is only a predictive factor of PLF (P = 0.0459). Hospital death occurred in 3 of 5 PLF. Two of the 3 hospital deaths occurred in patients who underwent surgery in 1990. The LTB was an apparently low value. The third death occurred from liver failure because of impeded blood flow in the liver.

Conclusion: LTB may be a good indicator for postoperative liver failure in major hepatectomy in patients with obstructive jaundice.

FOS039
PROGNOSTIC SIGNIFICANCE OF LYMPH-NODE METASTASES IN CHOLANGIOCARCINOMA, RESULTS OF MULTI-INSTITUTIONAL STUDY ON 481 PATIENTS

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Introduction: The prognosis of patients with cholangiocarcinoma (CCC) is poor, only curative surgery can allow long term survival. Lymph-node (LN) metastases is one of the most significant independent prognostic factors in patients with CCC. The aims of this study are to identify factors associated with outcome after surgical management of CCC (intrahepatic, perihilar and distal) and examine the impact of LN assessment on survival.

Methods: From a multi-institutional database (3 referral Centre), 481 patients who underwent surgery for CCC (171 intrahepatic, 243 per-hilar and 67 distal) between 1990 and 2010 were identified. 339 (70.4%) patients submitted to surgery with curative intent were the subject for this study. Clinical and pathologic data were evaluated using uni- and multivariate analyses.

Results: Median survival was 34.9 months, and 5-year survival was 31.3%. Factors associated with adverse prognosis included macrovascular invasion (HR, 1.86; P < 0.001), perineural invasion (HR, 1.55; P = 0.015), and T stage (AJCC seventh edition) (HR, 1.20; P = 0.042). Lymphadenectomy was performed in 229 patients (67.6%); 97 of these (42.4%) had LN metastasis. Median survival for N0 was 42.4 months vs 26.0 months fro N1; HR 1.48, P = 0.029). The number of positive LN and the ratio of positive LN (cut off value of 0.25) were significantly related with survival with HR of 1.48 (P < 0.01) and of 1.87 (P < 0.01). Multivariate analysis identified that prognostic factors were macrovascular invasion and LN ratio with HR of 1.65 (P = 0.01) and 1.59 (P = 0.03).

Conclusion: Macrovascular invasion, perineural invasion, T stage and LN metastasis were associated with survival. N1 status adversely affected overall survival. Lymphadenectomy should be strongly considered for CCC, because more than 40% of patients will have LN metastasis and the presence of positive LN metastases strongly affects the long term outcome of surgical resection.

FOS040

VALIDATION OF THE INTERNATIONAL STUDY GROUP OF LIVER SURGERY (ISGLS) DEFINITION AND GRADING OF BILE LEAKAGE AFTER HEPATOBILIARY AND PANCREATIC SURGERY

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Introduction: Despite postoperative bile leak being a common complication in patients undergoing hepatobiliary and pancreatic head surgery, definitions of postoperative bile leak vary widely, precluding accurate comparisons of surgical techniques and experiences. The ISGLS has proposed a classification scheme for bile leakage after hepatobiliary and pancreatic surgery. However, this definition and classification scheme has not been rigorously tested or validated.

Methods: Between August 2009 and December 2011, 181 consecutive patients underwent surgery of the liver, biliary tract or pancreas with potential for bile leakage from the cut surface of the liver, from injury of the bile ducts, or from anastomotic leakage after bilioenteric anastomosis. In all these patients, at least one abdominal drain was placed at surgery. Bile leak was defined by ISGLS criteria. Cases were divided into four categories: no bile leak; biochemical bile leak without clinical sequelae (grade A), bile leak requiring endoscopic or radiologic therapeutic intervention (grade B), and bile leak requiring relaparotomy (grade C). Clinical outcomes were analyzed across all grades including patients with no bile leak.

Results: 14 patients had a bile leak for an overall incidence of 7.7%. Grade A fistulas occurred in 7 patients, grade B in 6 patients, and grade C in 1 patient. Among the 6 patients with Grade B bile leak, 1 patient was classified as Grade B as hospital stay was prolonged by 10 days due to persistently high drain output which however resolved without intervention. In addition to the 6 patients with Grade B bile leak, 2 more patients subsequently developed bile leak which would have been graded as Grade B. Hence, applying the ISGLS definition could correctly identify only 75% patients with Grade B bile leak. Duration of stay, ICU duration, and additional diagnostic and therapeutic interventions progressively increased from grade A to C.

Conclusion: Biochemical evidence of bile leak alone has no clinical consequence. Increasing bile leak grades have negative clinical impact on patients. However, the ISGLS definition of bile leak does not always correctly identify patients with Grade B bile leaks. These findings partially validate the ISGLS classification scheme for bile leak.

FOS041

CHOLEDOCHAL CYST WITH MALIGNANCY: A SINGLE CENTRE EXPERIENCE

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Background and aim: Malignancy is a recognised complication of long standing choledochal cyst (CDC). Although it commonly occurs in the cyst wall itself, the entire hepatopancreatic-biliary region is at risk. We herein report our experience of the spectrum o f malignancies associated with CDC.

Methods: Of the 436 patients admitted with the diagnosis of CDC during January 2001 to May 2011, there were 34 cases (7.79%) of malignancy. Clinical presentation, type of cysts (as per Todani's modification of Alonso Lej classification), site of the tumour, management and follow up of these patients were analysed.

Result: A total of 34 patients of CDC with malignancy were diagnosed during the period form a prospective database. Twenty patients (58.8%) were found to have gall bladder cancer (GBC) and 14 patients (41.1%) had cholangiocarcinoma arising from the cyst wall. The majority of the patients were females (n = 25) and the mean age was 47 years (range 20–74). Twenty three had Type I, 9 had type IVa CDC and 2 had Type V cysts. There were no cases of malignancy in the patients between 0–15 years, 19 (55.8%) cases between 16–49 years and 15 (44.1%) in >50 years. Six of the 20 patients with GBC had metastatic disease on preoperative workup and 2 were found unresectable (metastasis-1, locally advanced-1) on surgical exploration. Radical cholecystectomy with excision of choledochal cyst was performed in 9 and additional resection of adjacent organs was required in 3 patients. Of the 14 patients with malignancy in the cyst wall, 7 had metastatic disease on preoperative workup and another 2 at the time of surgical exploration. One patient underwent Whipple's pancreato duodenectomy with cyst excision. Four others underwent excision of the extrahepatic biliary tree with the tumor. GBC had a respectability rate of 60% while cholangiocarcinoma had 35.7%. Overall resectability rate was 50%.

Conclusion: Choledochal cyst has a definite risk of malignancy in the cyst wall and the gall bladder, which was 7.79% in the current series. All CDC should thus be excised upon diagnosis.

FOS042

EVALUATION OF MODIFIED ESTIMATION OF PHYSIOLOGIC ABILITY AND SURGICAL STRESS IN PATIENTS UNDERGOING SURGERY FOR CHOLEDOCHOCYSTOLITHIASIS

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Introduction: The incidence of complicated choledochocystolithiasis is increasing with an aging society. Surgeons often wonder whether they should perform operations on their elderly patients. We recently constructed a model to predict postoperative morbidity and mortality in general surgery, termed modified Estimation of Physiologic Ability and Surgical Stress (mE-PASS) (Ann Surg 2011;253:194–201). This study was undertaken to evaluate the utility of this model in patients with choledochocystolithiasis.

Methods: A subset of 4329 patients from previous multicenter cohort studies was reanalyzed in the current study. The

patients had undergone surgery for choledochocystolithiasis in 44 Japanese referral hospitals between April 11, 1987 and April 6, 2007. The patients were analyzed for the predicted in-hospital mortality rates (R) of mE-PASS along with information on postoperative morbidity and mortality. The discrimination power of R to detect in-hospital mortality was assessed by calculating the area under the receiver operating characteristic curve (AUC). Categorical variables were compared between the groups using a chi-squared test with Yates correction for continuity.

Results: Postoperative mortality and morbidity rates were 0% and 3.0%, respectively, for laparoscopic cholecystectomy (n = 3442), 0.19% and 14.2% for open cholecystectomy (n = 521), 1.6% and 23.8% for laparoscopic choledochotomy (n = 63), 1.1% and 23.9% for open choledochotomy (n = 264) and 5.1% and 35.9% for plasty or resection of the common bile duct (n = 39). Overall, mE-PASS demonstrated a high discrimination power to predict in-hospital mortality in patients (AUC, 95% confidence intervals: 0.96, 0.94–0.99). When R increased, postoperative morbidity rates also increased significantly: 4.4% when R is less than 0.01 (n = 3967), 24.0% when R is 0.01 or greater but less than 0.05 (n = 312), and 42.0% when R is 0.05 or greater (n = 50); $P < 0.0001$.

Conclusion: Recent advances in endoscopic treatment for choledochocystolithiasis have enabled multiple therapeutic options for elderly patients. The current study suggests that mE-PASS may accurately predict postsurgical risk in patients with choledochocystolithiasis. mE-PASS will be useful for making medical decisions and obtaining informed consent from high-risk patients. Because mE-PASS requires only seven preoperative variables, the data entry will not significantly increase the workload of doctors.

FOS043
PORTAL VEIN INVASION IN PERIHILAR CHOLANGIOCARCINOMA: WHICH IS MORE PREDICTIVE, GROSS INSPECTION OR HISTOLOGY?

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Introduction: Combined portal vein (PV) resection has been universally applied in locally advanced perihilar cholangiocarcinoma. According to UICC system for perihilar cholangiocarcinoma, PV invasion is classified into three: no invasion (Category A), invasion of the ipsilateral portal vein treated as T3 (Category B), and that of the contralateral portal vein as T4 (Category C). This categorization is straightforward but lacks clinical validation.

Methods: Between 2001 and 2010, 386 patients with perihilar cholangiocarcinoma underwent surgical resection. Excluding 8 patients who died in hospital, 49 with pM1 disease, and 5 with insufficient information, the remaining 324 patients formed the cohort. PV resection was performed in 117 patients when the portal bifurcation was grossly involved. In this study, PV invasion was histologically defined as presence of cancer cell infiltration into the PV adventitia or deeper, and its extent was anatomically classified into three types: Category A to C. These pathologic factors were analyzed in terms of survival.

Results: Survival rate for patients without PV resection was 63.0% at 3 years and 55.6% at 5 years with a median survival time (MST) of 84.3 months; whereas that for patients with PV resection 43.1%, 29.5%, and 28.2 months, respectively ($p < 0.001$). In patients without PV resection, survival for Category A was comparable to that for Category B: MST of 92.1 versus 72.3 months, respectively ($p = 0.714$). In patients with PV resection, Category A, B and C had MST of 25.3, 36.8, and 27.7 months, respectively: the survival for Category B was comparable to that for Category A ($p = 0.772$) or Category C ($p = 0.721$).

Conclusion: PV resection (ie, gross PV invasion) has a great impact on survival. Stratified according to presence or absence of PV resection, anatomic extent of PV invasion has no prognostic impact. With or without gross PV invasion is more predictive variable than microscopic PV invasion.

FOS044
REPEAT REPAIR FOR BILE DUCT INJURY AFTER CHOLECYSTECTOMY

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Introduction: Iterative repair for bile duct injuries (BDI) after cholecystectomy remains technically challenging and with debated outcomes. We evaluated short and long-term outcomes of repeat repair for BDI at a single institution.

Methods: Data from 46 consecutive BDI referred to our institution between January 1991 and May 2011 were retrospectively reviewed. Patients were stratified into two groups according to the presence of a previous repair and statistically compared.

Results: There were twenty-four primary (52.1%) and twenty-two (47.8%) repeat repair. Patients in the repeat repair group were statistically younger ($P = 0.0001$), had BDI more often diagnosed intraoperatively ($P = 0.0007$), were statistically significantly referred later from BDI occurrence ($P = 0.044$) and with ongoing cholangitis ($P = 0.0071$). Patients in the repeat repair group underwent surgery at a later interval ($P = 0.001$) with no significant differences in term of postoperative mortality, morbidity, hospital stay and long-term stricture rate ($P > 0.05$). Patients with associated vascular injuries showed a significantly higher postoperative mortality ($P = 0.001$), higher morbidity ($P = 0.05$) and a statistically significant higher need for liver resection ($P = 0.0385$).

Conclusion: Repeat repairs for BDI show short and long term outcomes comparable to primary repairs when performed in tertiary centers. The presence of an associated vascular injury increases postoperative mortality, morbidity and the need for liver resection.

FOS045

DOES LIVER RESECTION CURE INCIDENTAL GALLBLADDER CANCER? A CRITICAL VIEW

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Introduction: Surgical management of gallbladder cancer (GC) is still controversial. Therapeutic efficacy and the appropriate extent of the liver resection still remains unclear.

Methods: A retrospective analysis of patients referred to the Hospital Argerich with diagnosis of incidental GC between June 1999 and June 2010 was performed. Patients were identified from the Liver Transplantation and Surgical Division prospective computerized database. Incidental (I) tumors were included. Data covering demographic features, clinical characteristics, local pathological stage, surgical procedure, morbidity, histological features and factors for long term survival were analyzed. Survival curves were estimated with the Kaplan-Meier method and compared using the log-rank test.

Results: 24 patients with IGC were resected: 20 females (83.3%). Median age 57.4 years (range 38–78). Local pathological stage was T1 (1), T2 (12), T3 (11). Laparoscopic cholecystectomy was performed in 4 patients (16.6%). All were treated by resection of segments 4b-5 and lymphadenectomy, port site excision was used in all laparoscopic resected patients. No peri-operative mortality, 20.8% morbidity (60% type I), R0 in 23 /24 (96%). Histological examination revealed microscopic tumor involvement in 29%, positive nodes in 12.5% and peritoneal invasion in 4.1% (T2 16%/T3 72% p 0.01), all presented recurrence between 3 and 12 month. Overall 5-year survival was 53% (stage AJCC 7thed. II 90%, IIIA 28%, IIIB and VI 0%) and in the univariate analyses was significantly associated with T stage ($p < 0.001$), TNM stage ($p < 0.001$), and residual tumor in histophatological examination of resected liver ($p < 0.001$).

Conclusion: Preoperative T stage is an important factor in determining survival as confirmed by our study. As T stage of the disease increase, the chance of finding residual disease and positive nodes increased and survival decrease dramatically. Patients with residual disease present recurrence and died into 15th month of follow-up.

FOS046

COMPARATIVE ANALYSIS OF LEFT VERSUS RIGHT SIDED RESECTION IN PATIENTS UNDERGOING LIVER SURGERY FOR KLATSKIN TUMOR: RIGHT SIDED RESECTIONS HAVE BETTER LONG TERM OUTCOME?

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Introduction: Achievement of negative margins in Klatskin tumor surgery has-been advocated as a main goal of curative intent treatment: a more aggressive treatment, including hilar and left or right sided liver parenchyma resection, allows to obtain a better long term outcome. Considering the anatomical relationships between the vascular hilar structures and bile duct, this study aims to compare short and long term outcome of left and right sided resections.

Methods: From January 2004 to December 2011, 94 patients with preoperative diagnosis of Klatskin tumor were candidated to surgery at the Hepatobiliary Surgery Unit of the Hospital San Raffaele in Milan: of these, 75 underwent major liver resection. The data of all patients were prospectively collected and are retrospectively reviewed. 46 patients underwent right sided resections (Right Group), while the remaining 29 left sided resections (Left Group). The two groups were compared in terms of perioperative morbidity and mortality and overall and disease free survival.

Results: The two groups were comparable in terms of patient and disease characteristics. Patients in Right Group needed more frequently preoperative PVE. The postoperative morbidity and mortality was greater in Right Group (56.6% and 8.7% respectively) than in the Left Group (34.5% and 3.4% respectively) ($p < 0.005$). The most frequent cause of death was postoperative liver failure (more frequent in the Right Group). R1 resections were 26.1% in the Right Group and 31.5% in the Left Group (p not significant). 5-years survival rate was 32% in the Right Group and 25% in the Left Group, with no significant differences. Recurrent disease was found in 70.6% of patients, without statistically significant differences between the two groups.

Conclusion: Right sided resections for Klatskin tumors are associated with a significantly higher postoperative morbidity compared with left sided, probably related to a greater parenchymal sacrifice. Despite this, they seem to be associated with better long-term survival (data require a validation on a larger scale), since resection of the right hepatic pedicle, which anatomically lies behind the biliary carrefour, may allow a full radicality in right sided lesions.

FOS047

PREDICTORS OF SURVIVAL IN GALLBLADDER CANCER: A REVIEW OF 90 PATIENTS SUBMITTED TO SURGERY WITH CURATIVE INTENT

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Introduction: Long-term survival from gallbladder cancer remains poor. One difficulty remains identifying patients who despite presenting with early disease, have an increased risk of recurrence and may benefit from more aggressive adjuvant treatment.

Methods: Retrospective review of all ($n = 90$) patients with gallbladder cancer submitted to surgery with curative intent in the past 10 years.

Results: 51 had previous surgery with 47 cholecystectomies. Those patients who had undergone previous surgery had superior survival (median 30 vs 18 m, $p = 0.0002$) which was maintained across all stages of disease. A positive cystic duct margin predicted residual disease and inferior survival on univariate analysis (HR 1.86, $p = 0.048$). Presenting with jaundice is confirmed as a strong predictor of unresectability and inferior survival (HR 2.68, $p = 0.003$) with all patients having recurrent disease. If residual disease was present at re-resection following cholecystectomy, the survival is no

better than patients not diagnosed incidentally. The extent of liver resection or resection of adjacent directly involved organs did not significantly impact survival.

Conclusion: Patients whose gallbladder cancer is diagnosed incidentally at cholecystectomy have improved survival even when stage is taken into account. The presence of residual disease at re-resection however, removes this survival advantage.

FOS048
K-RAS MUTATION IS STRONGLY ASSOCIATED WITH PERINEURAL INVASION AND REPRESENTS AN INDEPENDENT PROGNOSTIC FACTOR OF INTRAHEPATIC CHOLANGIOCARCINOMA AFTER HEPATECTOMY

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Introduction: Unsatisfying long-term survival of intrahepatic cholangiocarcinoma (ICC) triggers the clinicians searching for molecular markers, such as K-ras mutation, to tailor management strategy. Additionally, emergence of tyrosine kinase inhibitors (TKIs) brings the new hope to palliate advanced ICC; whereas whether the efficacy of TKIs is influenced by k-ras mutation is largely unknown. The aims of this study were to determine the prevalence of k-ras mutation and its clinical significance in ICC.

Methods: A total of 86 patients with ICC undergone hepatectomy were retrospectively recruited. K-ras mutation was determined using laser capture microdissection and direct sequencing method. Association among clinicopathological variables and K-ras mutation was analyzed. Prognostic factors of ICC after hepatectomy were also determined.

Results: There were 19 (22.0%) patients exhibiting K-ras mutations. Of them, 17 had their K-ras mutations occurring at codon 12, while the remaining two occurring at codon 13 and codon 61 in one each. Perineural invasion was exclusively the variable associated with K-ras mutation (Odds ratio, 6.9) using logistic regression analysis. Multivariate analysis demonstrated that resection margin, T-status, nodal metastasis and K-ras mutation were independent prognostic factors. The median survival of ICC patients with K-ras mutation was 5.7 months compared to 19.0 months in those without K-ras mutation ($p = 0.002$).

Conclusion: The prevalence of K-ras mutations in a considerably large cohort of ICC was 22%. K-ras mutation is strongly associated with perineural invasion phenotypically. K-ras mutation is an independent prognostic factor of ICC after hepatectomy.

FOS049
PROGNOSTIC FACTORS FOR GALLBLADDER CANCER IN THE LAPAROSCOPY ERA: IATROGENIC BILE SPILLAGE WORSENS THE PROGNOSIS

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Introduction: Hepatobiliary surgery has changed dramatically in the recent decades with the advent of laparoscopic techniques. The aim of this retrospective study was to compare survival rates according to stages, adjusting for important prognostic factors.

Methods: A retrospective study of a 17-year period from January 1994 to April 2011 was carried out. The cases studied were divided into 2 time period cohorts, those treated in the first 9 years (N = 109) and those treated in the last 7 years (N = 109).

Results: An operation with curative intent was performed on 218 patients. The 5-year survival rates according to the depth of invasion were as follows: 86% with T1, 56% with T2, 45% with T3, 5% with T4. The number of cases of incidental gallbladder cancer (GBC) found during 3919 laparoscopic cholecystectomies (LC) was 96 (2.4%). Incidental GBC revealed a better survival rate ($p = 0.003$). Iatrogenic bile spillage was found in 20 perforations of the gallbladder during LC, 16 preoperative percutaneous transhepatic gallbladder drainages (PTGBD) and 16 percutaneous transhepatic biliary drainages (PTBD). These patients showed a significantly lower survival rate than patients without iatrogenic bile spillage ($p < 0.01$).

Conclusion: This study found that the prognosis of GBC is still determined by the stage at presentation due to the aggressive biology of this tumor. Iatrogenic bile spillage and tumor violation is a risk factor that influences the prognosis of GBC. Early diagnosis, radical resection and appropriate adjuvant therapy can increase overall survival.

FOS050
PORTAL VEIN RESECTION FOR PERIHILAR CHOLANGIOCARCINOMA: UPDATED SURGICAL OUTCOME SINCE 2001

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Introduction: Resection of the portal vein (PV) has been frequently employed in surgery for advanced perihilar cholangiocarcinoma. Previously we reported surgical outcome of 52 patients who underwent PV resection before 2000, where mortality and 5-year survival was 10% and 10%, respectively (Ann Surg 2003). The aim of this study was to reappraise the current role of PV resection in patients with perihilar cholangiocarcinoma.

Methods: Between 2001 and 2010, a total of 513 patients with perihilar cholangiocarcinoma was treated in our service, 386 (75%) of whom underwent resection. PV resection was performed in 142 (37%) of the 386 patients when the bifurcation, contralateral PV, or the main PV was macroscopically

involved during the dissection of the hepatic hilus. Short- and long-term outcome of the 142 patients with PV resection (Group A) was compared to those of the 244 patients without (Group B) or the 127 unresected patients (Group C).

Results: Sixteen (11%) patients underwent wedge resection, followed by direct closure (n = 11) or patchy graft reconstruction (n = 5); the remaining 126 (89%) underwent segmental resection, followed by direct end-to-end anastomosis (n = 113) or interposition of the iliac vein graft (n = 13).

Complications of Clavien grade III or more occurred in 78 (55%) patients of Group A and 120 (50%) of Group B (p = 0.397); Re-operation was done in 8 (6%) and 7 (3%) patients, respectively (p = 0.275); and mortality was 4% (n = 6) and 1% (n = 2), respectively (p = 0.275). Overall survival rate for Group A was 23% at 5 years; that for Group B was 43%, respectively (p < 0.001). Survival for Group A was significantly better than that for Group C (4% at 3 years, p < 0.001).

Conclusion: Survival has improved (from 10% to 23% at 5 years) and mortality has reduced (from 10% to 4%), as compared to our previous report. Therefore, PV resection should be applied aggressively to selected patients with advanced perihilar cholangiocarcinoma.

FOS051
PROGNOSTIC IMPLICATION OF THE EXTENT OF RESECTION FOR ADVANCED GALLBLADDER CANCER

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Introduction: The extent of potentially curative resection in advanced (T2-4) gallbladder cancer is still a matter of debate. The aim of this study was to investigate the impact of extrahepatic biliary tree resection and extended (>segment IVB+V) resections on the patient survival.

Methods: From July 2003 to July 2011 161 patients with gallbladder cancer were referred to our centre and all details recorded in a prospectively maintained database. Of the 161 patients, 68 had potentially operable gallbladder cancer. 36/68 patients underwent a radical resection and were included in this study. 24/36 patients had a re-resection after cholecystectomy whereas 12/36 patients had a primary resection. Final histology was graded according to the 6th edition of the AJCC TNM staging system.

Results: There were 17 men and 19 women with a mean age of 63.3 years (range 41–85). Final histology was pT2 (n = 23), pT3 (n = 10), pT4 (n = 3). Of the 36 radical resections, 28 patients had non-anatomical segment IVB+V resection and 8 patients a more major resection including 3 extended right hepatectomy ± PV resection. 25/36 patients also had extra-hepatic biliary tree resection. Overall median survival was 27.8 months (range 3.2–106.4). In univariate analysis neither extra-hepatic biliary tree resection (p = 0.271) nor extended resection (p = 0.120) influenced survival. Adverse prognostic factors included R1 resection (p < 0.001), gallbladder bed invasion (p = 0.002), high lymph node ratio (p = 0.015), pT4 (p = 0.004). On multivariate analysis only R0 resection.

Conclusion: In this study, an R0 resection is the single most important variable associated with survival after radical resection for gallbladder cancer. Therefore extrahepatic biliary tree resection and extended resections are only indicated when a clear resection margin can be achieved.

FOS052
SURGICAL AMPULLECTOMY: A SAFE AND COMPLETE TREATMENT OF PRESUMED BENIGN AMPULLOMAS

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Introduction: Presumed benign ampullomas (PBA) can be treated by either pancreaticoduodenectomy (PD), endoscopic ampullectomy or surgical ampullectomy. Safe indication of SA needs to exclude preoperatively invasive carcinoma (Ca.) and should lead to a tumor-free margins to avoid the risks of subsequent PD or tumor recurrence. The aim of this study was to evaluate both feasibility and results of surgical ampullectomy (SA).

Methods: From 1995 to 2011, 49 pts (38–79 yrs) underwent SA for PBA revealed by pain/cholangitis (n = 14), pancreatitis (n = 7), incidentally (n = 22) or during follow-up after previous ampullectomy (n = 6, including 3 SA). Work-up included endoscopic ultrasound (EUS) and side-viewing duodenoscopy + biopsies (including 15 after sphincterotomy). EUS staging was uT1N0 in all pts. No ampullary lesion was ulcerated. Preoperative biopsies revealed either low-grade (n = 35) or high-grade dysplasia (n = 7), or inflammatory/normal mucosa (n = 7). Intraoperative frozen section (FS) was done routinely on resection margins. Patients were informed of the need for PD in case of positive margin proven intraoperatively or invasive Ca. on definitive pathologic examination.

Results: There was 1 (2%) immediate conversion to PD due to gross aspect suggestive of invasive Ca. confirmed histologically. At FS, 11 biliary + 5 pancreatic ductal margins were tumor-positive, needing 9 additional ductal resections (with tumor-free margins). Mean PBA size was 20 mm (range: 5–65). There was no postoperative death and no complications in 33 pts (67%) but 3 reoperations for complications (6%). Resection was R0 in all 48 pts with 8 non-adenomatous benign lesions, 32 adenomas (18 LGD, 14 HGD), 6 T1D0 Ca., and 2 invasive T1D1 Ca. (with one secondary PD due to pathological findings; the other one pt was unfit for PD). With a median 45 mo. follow-up (3–120), 5 (10%) pts had symptoms and 6 (12%) developed tumor recurrence with one reoperation.

Conclusion: SA with routine FS can treat PBA with no mortality and less morbidity than PD. SA can also obtain tumor-free margins, particularly along the common bile duct. SA can be performed after a previous ampullectomy, whatever surgical or endoscopic. After adequate preoperative

endoscopic work-up, the probability of invasive malignancy and the need for subsequent PD are less than 10%.

FOS053
SURGICAL TREATMENT OF TUMOR RECURRENCE FOLLOWING CURATIVE INTENT HEPATECTOMY FOR INTRAHEPATIC CHOLANGIOCARCINOMA

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Introduction: Long-term outcomes after hepatectomy for intrahepatic cholangiocarcinoma (IHC) are still ill-defined. In particular, scarce data exist on rates and pattern of recurrence following a curative intent resection as well as on the efficacy of a re-resection in the treatment of recurrent disease. Aim of this study was to examine frequency and type of treatment failure and the results of repeat surgery for tumor recurrences.

Methods: 575 consecutive patients treated with curative intent hepatectomy for IHC between 1995 and 2011 at 12 tertiary referral centers were identified from a multi-institutional registry created and prospectively maintained under the aegis of the Italian Chapter of the IHPBA. Survival data were updated at 10/2011 (median follow-up 42 months). Data on recurrence and surgical treatment were analysed.

Results: 52% of patients recurred after a median of 10 months (range 3–158), irrespective of the site of recurrence ($p > 0.05$). First site of recurrence was hepatic only (57%), extra-hepatic only (19.6%), intra- and extrahepatic (17.8%), and unknown (5.6%). 43 patients (15%) were treated with repeat surgery (36 liver, 3 pulmonary, 3 thoracic lymph node and 1 partial duodenal resections) with or without perioperative CTx for either single (27) or multiple (16) lesions. Postoperative mortality was nil. Rate and pattern of recurrence remained similar after repeat surgery with 25% of patients undergoing a 3rd resection. 5-yrs survival of patients whose recurrence was surgically treated was 43.6% from the 2nd resection and 64.0% from the 1st resection.

Conclusion: Over one-half of patients resected for IHC develop tumor recurrence. Although repeat surgery can be offered only to a subset of patients, an aggressive surgical approach significantly prolongs survival.

FOS054
THE IMPACT OF DELAY IN TREATMENT OF HILAR CHOLANGIOCARCINOMA ON RESECTABILITY AND SURVIVAL

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Introduction: Substantial time elapses before patients with hilar cholangiocarcinoma (HCCA) receive operative treatment, due to extensive preoperative staging and preoperative interventions, such as biliary drainage and portal vein embolisation. Long delays potentially lead to unresectability and formation of metastases, yet this has never been investigated before. Therefore we aimed to investigate the impact of treatment delay on resectability, metastases, tumour stage, and survival.

Methods: Treatment delays of consecutive patients with HCCA presenting in our center from January 2003 through August 2010 were evaluated by contacting GPs, and by evaluating local hospital files. Presenting symptoms as well as time and cause of delay were retrieved and correlated with resectability, metastases, tumour stage, and survival by logistic and Cox regression analysis.

Results: Treatment delays in 210 consecutive HCCA patients were evaluated. Median delay from first visit to GP until presentation in our (tertiary) center was 36 days. Delay was longer (days) when initial symptoms did not include jaundice (aspecific symptoms, $p < 0.001$). Duration of preoperative work-up and optimization of preoperative biliary drainage in our center to final surgical treatment resulted in an additional median delay of 74 days. No correlation was found between delay in weeks and resectability [odds ratio (OR): 0.986 (0.962–1.009)], metastasis 0.947 (0.898–0.998), tumour stage [OR: 1.003 (0.979–10.28)], and survival in resected patients [hazard ratio: 0.996 (0.953–1.041)].

Conclusion: The delay between presenting symptoms and final treatment in patients with HCCA is substantial, especially in patients with aspecific symptoms. This delay however does not affect resectability, metastasis, tumour stage, or survival, suggesting that preoperative optimization should not be omitted because of potential resulting delays.

FOS055
MODULATION OF GUT BARRIER FUNCTION IN PATIENTS WITH OBSTRUCTIVE JAUNDICE USING LP299V

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Introduction: The barrier function of the gastrointestinal tract is defective in patients with obstructive jaundice, and may be improved with the probiotic LP299v. Previous studies have shown LP299v prevented an increase in intestinal permeability in rats, however this response has not been assessed in humans. This study aimed to determine the effect of LP229v on intestinal permeability and TNF p55 receptor

concentrations in patients with obstructive jaundice pre and post biliary drainage.

Methods: This prospective trial involved patients undergoing endoscopic or surgical biliary drainage over a 1 year period. Patients were randomised to three groups to receive LP299v, inactivated LP299v (placebo) or water daily; given at noon for 7 consecutive days. Inclusion criteria included visible presence of jaundice, a history of pale stools and dark urine (in keeping with symptoms of extrahepatic biliary obstruction) and a serum bilirubin greater than 80 μmol/l. Lactulose/mannitol was given to measure intestinal permeability on admission, the day before biliary drainage, and on days 1 and 7 following biliary drainage. Urine was collected for laculose/mannitol (L/M) ratio and serum TNF p55 receptor concentration was measured at each time point.

Results: 25 patients were recruited; 12 had choledocholithiasis and 9 had a periampullary tumour. 9 patients had open biliary drainage, 12 ERCP and 5 PTC. After exclusions, 5 received LP299v, 5 placebo and 7 water. Median L/M ratio was 0.035 (0.018–0.065) at baseline. There was no significant difference between the groups on admission, pre-drainage and day 7 drainage ($p = 0.59$, 0.175 and 0.61 respectively). However, the L/M ratio was significantly lower in the LP299v group on day 1 post-drainage (0.01 [0.01] vs. 0.18 [0.03–0.3] and 0.11 [0.07–0.14]; $p = 0.37$). Although, TNF p55 receptor was lower on day 1 post-drainage in $LP299_V$ group (15.3 ng/ml vs. 30.9 and 82.7; $p = 0.43$), there was no significant difference in concentration at any of the four time points.

Conclusion: Pre-treatment with probiotic LP299v improves intestinal permeablility immediately following biliary drainage and may attenuate a subsequent inflammatory response in patients following biliary intervention for obstructive jaundice. However, a much larger mutli-centre trial is required to determine the effects on clinical outcome.

FOS056
SURGICAL STRATEGY OF T2 GALLBLADDER CANCER: A MULTICENTER SURVEY

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Introduction: Although all the guidelines suggest that T2 gallbladder (GB) cancer should be treated by extended cholecystectomy and almost every surgeon would agree with that, the high level scientific evidence is lack because there has been no randomized controlled trial on gallbladder cancer till now. The aim of this study is to investigate clinical feature and clinical outcome of T2 GB cancer and to determine surgical strategy for T2 GB cancer through a multicenter survey.

Methods: A nationwide multicenter study was performed in which 14 university hospitals in Korea participated from 1995 to 2004. A total 431 patients with T2 were enrolled. The clinicopathologic findings & long-term follow-up results were analyzed after the consensus meeting of the Korean Pancreas Surgery Club.

Results: Mean age was 63-years-old and male to female ratio was 1 : 1.3. Simple cholecystectomy (SC) was performed in 214 patients (49.4%) and extended cholecystectomy (EC) in 206 patients (47.8%). Curative resection was performed in 82% of the patients. Lymph node metastasis was observed in 108 patients (108/292, 37.0%). The overall 5 year survival rate was 45%. Lymph node dissection and EC was associated with an improvement in overall survival. However, if curative resection was performed, there was no significant difference in survival between EC and SC. Recurrence occurred in 86 patients (24.3%) and among them 35 patients (40.7%) after SC and 51 (59.3%) after EC ($p = 0.11$).

Conclusion: If curative resection could be performed, simple cholecystectomy and lymph node dissection would be recommended for T2 gallbladder cancer patients.

FOS057
AGGRESSIVE SURGICAL RESECTION FOR ADVANCED HILAR CHOLANGIOCARCINOMA: EXAMINATION OF TUMOR EPICENTER AND PATTERNS OF RECURRENCE

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Introduction: Over the last few decades, more aggressive surgical management has been used for patients with hilar cholangiocarcinoma. Few large single center series are available given its low incidence and high rate of unresectability. Long term outcomes and patterns of recurrence are still poorly understood.

Methods: The objective of this study was to analyze outcomes following resection of patients with hilar cholangiocarcinoma at a high volume HPB center. A retrospective review was performed of patients who underwent resection from 1982–2009. 108 patients were evaluated and divided into 2 time periods: Era 1 (1982–1999) and Era 2 (2000–2009). Demographic, operative, clinical and pathologic data was collected. A detailed pathologic review was performed on cases where original gross pathologic specimens were available for analysis. Disease-free and overall survival was examined. Predictors and patterns of recurrence were identified.

Results: No differences in patient demographics were noted. There were more R0 resections in era 2 (77.3% vs. 60.3%, $p = 0.042$). However, overall 5-year survival rates were similar (40% vs. 37%, $p = 0.402$). Patients in Era 2 had more advanced disease (Stage IIIb or greater, 51.2% vs. 15.9%) ($p < 0.001$). Recurrence with distant metastases was more frequent in patients in Era 2 (12/44 patients vs. 5/57 patients, $p = 0.014$); however, local recurrence rates were statistically similar. Tumor epicenter was examined in 35 patients. Patients in which tumors derived from 1st order branches had a trend towards improved 5-year survival as compared to patients whose tumor epicenter was identified at the bifurcation or the main duct (78% vs. 18%, $p = 0.069$).

Conclusion: Aggressive surgical resection of more advanced hilar cholangiocarcinoma results in higher rates of R0 resections, excellent local recurrence rates, and good long-

term survival. Despite this, patients with advanced disease still recur with distant disease. Tumor epicenter may represent a new pathologic prognostic feature that requires further study. Better adjuvant treatments need to be developed to obtain better long term survival.

FOS058
DELAYED VERSUS EARLY LAPAROSCOPIC CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS: A PROSPECTIVE RANDOMIZED STUDY

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Introduction: The optimal timing to operate acute biliary cholecystitis remains debated. Immediate surgery is proposed usually within 72 hours, and for longer evolution, delayed operation is recommended. However, the results in the literature are still confusing. Some randomized controlled-trials found no differences in term of complications between early and delayed operation, but the exact onset of symptoms was not clearly defined. The aim of our present study is to compare the clinical outcomes of early versus delayed laparoscopic cholecystectomies in patients with more than 72 hours of acute cholecystitis symptoms.

Methods: This a monocentric non-blinded prospective randomized study. All patients older than 16 years admitted with acute biliary cholecystitis radiologically proven and with more than 72 hours symptoms were proposed the study. Exclusion criteria were pregnancy, acute pancreatitis, cholangitis, generalized peritonitis, perforated gallbladder, immunosuppression and severe sepsis. In the early group, laparoscopic cholecystectomy with 3 trocarts was performed immediately following diagnosis. In the delayed group, a standardized conservative treatment with antibiotics was initiated and an elective cholecystectomy scheduled at least 6 weeks after the initial diagnosis.

Primary outcome was the overall morbidity following initial diagnosis. Secondary outcomes were postoperative complications, operative time, and total length of hospital stay. According to power calculation with alpha of 0.025 and a power of 80%, 466 patients were required to show the absence of difference in terms of complications between both groups. An intermediary analysis after the 50 first patients was planned. Both groups were compared by intention-to-treat analysis and using ^{2} or Mann-Whitney U tests where appropriate.

Results: In the present intermediate analysis, 54 patients were randomized. In the early group, 1 patient out 27 could not be immediately operated and was postponed. In the delayed group, 2 patients had to be operated following their primary admission due to clinical aggravation under antibiotic treatment. Both groups were comparable for age, gender, BMI, ASA, and duration of symptoms prior to admission. In terms of overall morbidity following primary diagnosis, there was a significant difference favoring early cholecystectomy ($p = 0.044$). In the early group, 6 patients had complications: two acute pulmonary oedema, one surgical site infection, two postoperative choledocholithiasis requiring ERCP, and one presented with postoperative pain necessitating readmission. In the delayed group, there were 13 patients with complications: two had aggravating sepsis despite antibiotics, one parietal hematoma during primary stay, six patients needed readmission before elective operation (two symptomatic cholecystolithiasis, one choledocholithiasis, one pancreatitis, and two recurring cholecystitis), and four patients developed postoperative complications (one biliary leak, one surgical site infection, one urinary retention, and one umbilical pain). Of note, between immediate and delayed operation, we observed no significant difference in operative time and postoperative complication rate. Regarding total length of stay, a significant difference in favor of early (median 4 days, range 2–21) vs. delayed (median 7 days, range 3–16) was found.

Conclusion: Our intermediate analysis suggest that laparoscopic cholecystectomy even after 72 hours of symptoms is safe and may be recommended, as delayed approach seems to be associated with an increased complication rate and length of stay. This results need to be confirmed by the final analysis.

FOS059
QUALITY OF LIFE IN INOPERABLE HEPATOPANCREATOBILIARY MALIGNANCIES – A PILOT STUDY TO ASSESS THE EFFECTS OF PALLIATIVE INTERVENTIONS AGAINST CONSERVATIVE END OF LIFE CARE

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Introduction: Hepatobiliary and pancreatic cancers are very common in India. Most of our patients here present at a very advanced stage beyond curative surgery. They have very poor quality of life owing to disease related symptoms like jaundice, itching, ascites, anorexia etc. Some of these patients opt for palliative interventions but several others refuse palliation on personal choice or for prohibitive expenses. We carried out a pilot study to assess the difference in quality of life (QOL) and survival.

Methods: Twenty patients with inoperable hepatopancreaticobiliary malignancies admitted at our center between January to December 2010 were placed under two groups – as those who opted palliative interventions (Group A) and those who refused (Group B). The FACT-Hep (Functional assessment of cancer therapy-hepatobiliary) questionnaire was used to record the QOL indicators in these patients at the time of presentation and subsequently at monthly intervals till they last consented. The data was analyzed for median survival time and standard multiple regression was performed to assess any relation with QOL parameters with survival time. Logistic regression was performed to predict survival from QOL parameters.

Results: Twenty patients enrolled for the study in one year and were distributed as twelve (Group A) and 8 (Group B). Median survival in group A was significantly higher than in group B (3.6 months vs. 2.6 months $P < 0.05$) Multiple Regression analysis of survival time in both groups as a dependant variable of QOL FACT subscale scores revealed clinically insignificant variance of survival time (Adjusted R square min. 5.8%, max 18%, regression coefficient beta; 0.217–0.542, $P < 0.05$) with QOL parameters. Logistic

Regression of predicting survival as dependant variable with multiple covariate FACT subscale scores also revealed insignificant variance in survival (Cox and Snell R square 6.04%–12.24%, regression coefficient beta 0.324–0.262, $P < 0.05$).
Conclusion: We conclude that although palliative interventions significantly increases median survival times in patients with inoperable hepatopancreaticobiliary cancers, QOL is not a significant predictor of survival and there is no significant relation between QOL and survival times.

FOS060
CLINIC AND MORPHOLOGIC GROUND OF PARENCHYMA PRESERVING (NONRESECTIONAL) TECHNIQUES IN CHRONIC PANCREATITIS PATIENTS

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Introduction: Resectional nature of Beger and Frey techniques in chronic pancreatitis (CP) surgery is established by severe morphologic changes in pancreatic head but the comparison with pancreatic body and tail morphology is missing.
Methods: 44 CP patients have undergone parenchyma preserving operation – longitudinal total pancreatowirsungoduodenopapillotomy with longitudinal Roux-en-Y pancreaticojejunoduodenostomy. Intraoperatively tissue samples were taken from pancreatic head, body and tail in all the patients. The samples were examined by histologic and immunohystochemical methods determining fibrosis prevalence, IV type collagen, a-SMA-positive stellate cells – excessive collagen producers. Also immune infiltration was examined. 41 (93.2%) patients had alcohol CP. Patients workup included: US, CT, ERSP, intraoperative US, C-peptide, endogenic insulin, parathormone, CA-19-9, IgG, fecal elastase-1.
Results: The morphology revealed absolute homogeneous changes in head, body and tail of the pancreas: considerable area of periductal fibrosis with immune infiltration zones, formation of thick peculiar connective tissue inclosure. There was a big number of activated a-SMA-positive stellate cells in the fibrotic zone, substantial expression of IV type collagen and intussusception of a-SMA-positive stellate cells from periductal fibrosis zone into interlobular pancreatic stroma with formation of interlobular fibrotic septa of different degree. In the remote period all patients were pain-free. CP patients without exocrine (23/44; 52.3%) and endocrine (34/44; 77.3%) insufficiency did not gain malnutrition and pancreatogenic diabetes postoperatively.
Conclusion: Revealed absolutely homogeneous morphologic changes in CP patient's pancreatic head, body and tail are the consequences of the long-lasting untreated pancreatic ductal hypertension and prove to be a ground of giving-up resectional techniques in CP surgery. CP patients require parenchyma preserving type of surgery.

FOS061
DEVELOPMENT OF A SURGICAL TEMPLATE SYSTEM FOR APPLICATION IN IMAGE GUIDED LIVER SURGERY

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Introduction: Surgical instrument guidance systems can increase the spatial accuracy during liver tumor resections and ablations. A main challenge of their application is the transfer of the preoperative planning data (based on CT or MRI) to the intraoperative setting, especially owing to liver deformation and movement during surgery. We propose a patient-specific 3D mesh placed around the liver to exactly reproduce its shape (known at the time of imaging) enabling the tracking of its position during surgery.
Methods: A first biocompatible, sterilisable, polymer-based plastic mesh was produced using a rapid-prototyping process for a patient scheduled for surgical resection of liver metastases. The liver surface was segmented in the preoperative CT and then meshed, resulting in a 3D grid reproducing the shape of the liver. The mesh was reduced to the parts relevant for maintaining the organ shape and separated into 3 sub parts to be mounted around the liver. In addition, retroreflective spheres were added to enable tracking in a surgical instrument guidance system (CAScination, Bern, CH). During surgery, the mesh could be tracked by the system.
Results: The mesh was successfully placed around the liver and mounted during surgery, successfully constraining the liver to its preoperative shape and size, even after complete mobilisation. The liver was co-registered to its image data (MeVis, Bremen, Germany) by identifying corresponding landmarks both on the liver and on the mesh. A fiducial registration error of 1.8 mm was obtained, compared to a median error of 6.3 mm when the registration was carried out using standard anatomical landmark registration. We have tested the feasibility of this approach in a first patient.
Conclusion: Navigated surgery in soft tissues is complicated by organ deformation. Here we successfully show that constraining templates are relatively simple to design, manufacture and apply in a patient-specific clinical setting. Preliminary tests indicate that the accuracy of patient-to-image registration and thus instrument guidance is improved. Future work will show whether this method meets the requirements of standard clinical routine, improving patient outcome in the long term.

FOS062

IMPROVED OUTCOMES OF RADICAL SURGERY FOR CENTRAL HYDATID CYSTSS OF THE LIVER: IS AN AGGRESSIVE APPROACH JUSTIFIED?

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Introduction: Radical surgery is considered the treatment of choice for liver hydatidosis, but it's more technically demanding. This is why the percentage of radical procedures vary in different series, especially for central or complicated cysts. Within a training project in HBP surgery at Peja Hospital, Kosovo (an endemic area) a prospective study was carried out to assess what kind of improvements in radical surgery can be obtained applying the surgical techniques used in developed countries.

Methods: From Jun 2007 to Sept 2009, 11 consecutive patients (pts) (F = 5, M = 6, mean age 30.5 ± 13.08 yrs (range 8–54) with 18 cysts (mean diameter 7.9 ± 3.07 cm) were treated for liver hydatidosis in the Surgical Division of Peja Hospital, Kosovo. Five pts had multiple cysts. One pts had recurrent hydatidosis. All patients received Mebendazol in the perioperative period. Medical therapy was discontinued the day after operation if the cysts were not opened (all but 2 cysts). Pts were classified to have peripherical (n = 1) or centrally (n = 10) located cysts when at least one of them was in close relationship with the main vascular and biliary structures. Preoperative evaluation included a CT scan in all pts and in all of them was planned a radical operation.

Results: Eleven pts with 18 cysts not suitable for PAIR underwent radical surgery and 17/18 cysts (94%) were totally removed (1 right hepatectomy, 2 left lobectomy, 10 total pericistectomy with closed and 1 with opened cyst). One pt with cyst fistulized in the right posterior bile duct underwent a subtotal perycistectomy;. Mean operative time was 206 ± 81 min. Intermittent Pringle manouver was used in 2 cases; in the other cases selective inflow control on demand was performed. Inferior vena cava was prepared for clamping in 2 cases, but never used. Mean postoperative stay was 4.9 days (range 3–10). One pt had a low output biliary fistula that healed in 9 days. No recurrences were observed during follow-up (mean 24 months, range 2–52 months).

Conclusion: Central cysts need to be considered for radical surgery and referred to centers in which this surgery can be carried out with acceptable risk. In this setting: 1) Careful preoperative planning and meticulous dissections of cysts is required to minimize the complication rate. 2) Impeachment of the caval and the main hepatic veins was not considered an absolute contraindication to radical surgery, and the only limit was to avoid unwanted ligation of a main branch of the bile ducts or portal vein.

FOS063

THE SURGICAL IMPACT OF THE INFERIOR RIGHT HEPATIC VEIN IN RIGHT ANTERIOR OR POSTERIOR SECTIONECTOMY

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Introduction: Glissonean pedicle transection method (GPTM) in right anterior sectionectomy (RAS) or right posterior sectionectomy (RPS) can enable the precise anatomical hepatectomy, and in consequence right hepatic vein (RHV) has to be exposed. However, the existence of inferior right hepatic vein (IRHV) may affect the course of RHV, so RHV couldn't aid anatomical hepatectomy. The aim of this study is for the evaluation of the affect of IRHV to the exposure of RHV.

Methods: From January 2009 to October 2011, 147 patients, 102 men and 45 women, have underwent RAS or RPS. Every patient underwent hepatectomy using GPTM and was tried to expose RHV as possible for a precise anatomical hepatectomy. We reviewed operative records for the extent of exposure of RHV and the existence of IRHV retrospectively, and measured the size of RHV and IRHV by referring preoperative CT scan.

Results: Of the patients, 90 (61.2%) patients underwent RAS, 57 (38.8%) patients underwent RPS. The size of RHV ranged from 2.2 cm to 15.0 cm with an average of 7.6 cm. The size of IRHV ranged from 1.9 cm to 9.5 cm with an average of 5.0 cm. The extent of exposure of RHV is graded 3 stages, the stage of no exposure was 24 (16.3%) (with IRHV, 18 cases; without IRHV, 6 cases), the stage of half exposure was 33 (22.4%) (with IRHV, 17 cases; without IRHV, 16 cases), the stage of full exposure was 90 (61.2%) (with IRHV, 25 cases; without IRHV, 25 cases). And there was linear correlation between the extent of RHV and the existence of IRHV ($p < 0.001$).

Conclusion: In RAS or RPS, RHV play a role in an accurate parenchymal dissection as an anatomical border. The existence of IRHV affects the course of RHV and in consequence affects the extent of exposure of RHV, because IRHV drains mainly segment 6. Therefore, when we plan RAS or RPS, we must evaluate the existence of IRHV, and then for a precise anatomical resection, more careful parenchymal dissection following the demarcation of liver after GPTM is recommended.

FOS064

RESOURCE UTILIZATION IN HEPATIC SURGERY: CAN WE PREDICT (AND POSSIBLY REDUCE) THE NEED FOR REOPERATION AND HOSPITAL READMISSION?

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Introduction: Although the mortality rate following partial hepatectomy has profoundly improved over time, this proce-

dure is still associated with significant morbidity and resource utilization. The goal of this investigation was to characterize the prevalence and pattern of early re-operation (ReOp) and re-admission (ReAd) following partial hepatectomy as well as to identify risk factors for both.

Methods: Peri-operative outcomes of 1281 patients undergoing hepatic resection at a single academic hospital from 1996–2009 were analyzed. The indications for early (within 90 days) ReOp and ReAd were reviewed. Standard multivariate logistic regression analyses were performed assessing the predictive value of standard perioperative variables on the need for ReOp and ReAd.

Results: 91 patients (7.1%) required ReOp. The most frequent procedure was exploration for hemorrhage (26.4%). The peri-operative mortality in patients requiring ReOp was significantly higher than for those not requiring ReOp (22% vs. 3.5%, $p < 0.001$). Factors predicting ReOp included concomitant non-hepatic procedures, greater blood loss, and the presence of COPD.

184 patients (14.4%) required ReAd. The most frequent indication was intra-abdominal fluid collection (27.2%). Combined length of stay for patients requiring ReAd was significantly longer than for those not requiring ReAd (21.9 vs. 9.0 days, $p < 0.001$). Factors predicting ReAd included major hepatectomy, concomitant non-hepatic procedures, and development of major complications.

Conclusion: In the current era of hepatic surgery, early reoperation and hospital readmission remain relatively frequent. As we look to decrease our initial lengths of stay in patients who are increasingly receiving regionalized care far from home, we must be mindful of the need for frequent rehospitalizations. In an effort to better serve our patients, and because these events represent important determinants of overall resource utilization, strategies to minimize them are critical.

FOS065
FIBROCAPS™, A NOVEL FIBRIN SEALANT, FOR BLEEDING DURING HEPATIC RESECTION: RESULTS OF A PHASE 2, RANDOMIZED, CONTROLLED STUDY

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Introduction: Fibrin sealants mimic the final stage of the clotting cascade and are used when control of bleeding by surgical technique is difficult. Diffuse bleeding of the hepatic resection surface can be a problem due to the vascularity of the liver, for which fibrin sealants have been used. Fibrocaps™ (ProFibrix, Leiden, The Netherlands) is a ready-to-use, premixed powder blend of human plasma-derived fibrinogen and thrombin. We conducted a study of the efficacy and safety of Fibrocaps in liver surgery.

Methods: Study FC-002 NL was a Phase 2, randomized, single-blind, controlled, comparative efficacy and safety study of Fibrocaps in subjects with diffuse bleeding during hepatic resection at 5 centers in The Netherlands. 56 subjects were randomized (2 : 1) during surgery to Fibrocaps (n = 39) or gelatin sponge (n = 17). Treatment was followed by a 10-min observation period where hemostasis was evaluated every minute, with failure defined as lack of hemostasis by 10 min. The primary efficacy endpoint was the mean time to hemostasis (TTH), and the secondary was the incidence of hemostasis at 10, 5 and 3 min. Overall safety was determined by treatment-emergent adverse events, clinical labs and anti-thrombin antibodies monitored for 4 weeks after treatment.

Results: Subject demographics were similar across both treatment groups (64% male, mean age of 61 yrs). The mean ± SD dose of Fibrocaps was 1.4 ± 0.5 g used for a mean ± SD bleeding surface area of 58 ± 29 cm^2. There was a statistically significant reduction on the intent-to-treat analysis of the mean TTH of Fibrocaps 2.2 ± 1.2 min vs. gelatin sponge 4.4 ± 3.1 ($p = 0.004$). There were no treatment failures in the Fibrocaps arm and 3 in the control arm ($p = 0.025$). The incidence of hemostasis at 5 min was also statistically significant for Fibrocaps ($p = 0.022$). The safety was comparable across both treatments, with most AEs gastrointestinal, and classified mild or moderate and unrelated to treatment. No neutralizing anti-thrombin antibodies were detected.

Conclusion: These efficacy results with Fibrocaps in liver surgery demonstrate a significant reduction in mean bleeding time across patients and in the incidence of treatment failure. The safety profile of Fibrocaps in this study was very good and consistent with events expected in subjects with multiple diseases undergoing major hepatic resection under general anesthesia. The observed benefit: risk profile strongly supports the conduct of a Phase 3 study in surgical hemostasis.

FOS066
TOWARDS HIGHER PRECISION IN INSTRUMENT GUIDED LIVER SURGERY: AUTOMATIC ALIGNMENT OF 3D ULTRASOUND WITH PRE-OPERATIVE MEVIS-CT

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Introduction: Progress in computer sciences enables the use of instrument guidance systems for open liver surgery by providing improved orientation and guidance support during planning and intraoperative realization. Precise alignment between preoperative image data and the intraoperative situation remains challenging as the liver deforms during the surgery. We present a framework to allow for such alignment using intraoperative ultrasound imaging (US) and preoperative computed tomography (MeVis-CT) data.

Methods: A total of 14 corresponding CT and US datasets (both in 3D) were collected during open liver surgery of 9 patients (58 ± 28 yrs, 3 males, 6 females) using the CAS-One liver navigation system (CAScination AG, Switzerland). The following protocol was performed: 1) Pre-alignment of the MeVis-CT model with the real patient using manually selected landmarks. 2) Acquisition of 3D volumes of B-mode

navigated US images on a desired site of interest (SOI) (e.g. around tumours). 3) Segmentation of available vessel in the US images. 4) Generation of 3D US vessel model. 5) Implementation of an algorithm aligning the 3D vessel models of the US with that of the pre-operative MeVis-CT data. 6) Measurement of success of the alignment process.

Results: Manual pre-alignment was achieved with a mean accuracy of 11 mm. Large vessels (e.g. cross of the portal vein) were visually identifiable on the 3D US generated model. In 8/14 (57%) datasets, alignment between the CT and US was improved according to visual inspection. Alignment did not improve in 34% of the cases, attributed to insufficient amount of vessel information in the acquired SOI (e.g. large tumours) (28%), non-convergence of alignment algorithm due to poor US image quality (7%), and an unclear technical failure of the algorithm (7%). US acquisition, vessel segmentation and automatic alignment required 49 seconds of time on average. A more quantitative assessment for alignment accuracy is currently under development.

Conclusion: We present first results on the evaluation of an automatic US based registration approach. This will allow for precise alignment of the intraoperative situation with the pre-operative image data. First qualitative results indicate that its precision is better than those in existing (manual) alignment approaches. Involved clinicians confirmed the general usability of the presented framework in clinical routine. More data sets are currently collected to assess the precision of the approach.

FOS067
INTRODUCTION OF AN ENHANCED RECOVERY PROTOCOL CAN REDUCE LENGTH OF STAY FOLLOWING LIVER RESECTION

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Introduction: The principles of enhanced recovery after surgery are well established in colorectal surgery. Recent data points towards similar benefits following liver resection. This study aims to assess the impact of the introduction of a multi-modal fast-track package of care (Enhanced Recovery Protocol, ERP) aimed at improving outcomes and reducing length of hospital stay.

Methods: Patients undergoing elective liver resection following introduction of ERP in 2011 constitute the intervention group (N = 42). The control group underwent surgery and standard care in 2009 and 2010 (N = 43). The ERP included preoperative counselling, avoidance of preoperative fasting, carbohydrate loading, epidural anaesthesia, early postoperative feeding and early mobilisation. The primary outcome measure was length of postoperative stay. Secondary outcome measures were complication rates, transfusion requirement, 30 day readmission rate and mortality. Data are presented as median (range). Analyses were undertaken by non-parametric Mann-Whitney U-test accepting significance at $P < 0.05$ level.

Results: In the control group the median length of stay was 9 (4–19) days. There was a reduction in length of stay in the enhanced recovery group at 7 (3–44) days ($P = 0.01$). There were no significant differences in the rate of complications, 30-day readmission rate or transfusion requirement between the two groups. The overall mortality rate was 1.2% with no difference between the groups.

Conclusion: The introduction of a multi-modal enhanced recovery protocol can improve length of stay following liver resection without adverse impact on the overall quality of care.

FOS068
FUTURE REMNANT LIVER VOLUME AND FUNCTION, THE INFLUENCE OF PORTAL VEIN EMBOLIZATION

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Introduction: The only curative therapy by patients with Klatskin Tumor is a surgical resection. Extended resection of right liver lobe en block with extra hepatic bile duct is the standard operating procedure. The postoperative liver insufficiency according to the low future remnant liver (FRL) worsens the outcome. Selective portal vein embolisation (PVE) prior to resection improves the FRL volume. Still the influence of PVE on the function of the FRL is not known.

Methods: Patients undergoing (PVE) and not (non-PVE) before extended resection of the right liver lobe were included into the study on the prospective manner. Liver function was measured using the new LiMAx-test ([µg/kg/min]) and biochemical liver function tests. Volume of the left lateral liver lobe (FRL) was measured using Amira Software (contrast enhanced CT-scans). Dindo classification was used for assessment of the postoperative complications.

Results: 14 and 23 patients were included into PVE and non-PVE groups respectively. The FRL volume increased from 320 to 445 ml (18 to 25%, $p < 0.001$) in PVE group. FRL volume in non-PVE group was 602 ml (32%, $p < 0.05$ vs. PVE). Function of FRL improved from 65 to 103 (18 to 24% respectively, $p = 0.001$). FRL function in non-PVE group was 121 (32%, $p < 0.05$ vs. PVE). The postoperative liver function course was better in non-PVE group till POD 10 ($p = 0.03$), then improved up to 3rd postoperative month. 30 days mortality was similar: 9 and 14% (PVE vs. non-PVE, n.s.), still the PVE group developed more severe complications (Dindo > II, 68 vs. 43%, n.s.). The increase of FRL volume but not FRL function was correlated with time (Pearson = 0.757, $p < 0.001$).

Conclusion: PVE improves as well the FRL volume as FRL function. By calculating the FRL function instead of volume more precise estimation of postoperative liver function and risk of complications is possible. Since FRL function improves faster than volume, the shorter time between PVE and resection resulting with lower risk of the tumor growth will be possible.

FOS069

RESULTS OF AN INTERNATIONAL SURVEY ON LAPAROSCOPIC LIVER SURGERY IN THE HPB COMMUNITY

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Introduction: Liver resection remains one of the few procedures where the extended use of laparoscopic techniques has not found its way to everyday practice yet. Although laparoscopic liver resections are gaining popularity worldwide, the experience in several countries is still limited. The objective of this survey was to investigate the differences within the worldwide HPB community in the use of a laparoscopic approach for liver resections.

Methods: An international web-based electronic survey consisting of 32 questions concerning various aspects of laparoscopic liver surgery was sent out to 502 HPB surgeons worldwide in February 2011. Two reminders were sent in April and May 2011 to non-responders and individuals, who had partially completed the survey. Statistical analysis was performed in December 2011 using SurveyMonkey and SPSS.

Results: A total of 164 surgeons from 38 different countries responded (response rate 32.7%) of which 134 (81%) finished the survey completely. According to responding surgeons, of which 70% were trained in laparoscopic liver surgery, the two most important aspects for a laparoscopic approach are safety and time to recovery. However, the choice for laparoscopy is also influenced by surgeon and patient preference. Half of participants believe laparoscopy has no advantages over open surgery with regard to safety and costs. Only 10% of surgeons indicated the availability of guidelines for laparoscopic liver surgery in their country. Twenty-four percent of participants believe cultural differences exist between countries in the choice for laparoscopy.

Conclusion: Opinions considering safety and cost-effectiveness of laparoscopic liver surgery vary widely between liver surgeons. Uncertainties and lack of guidelines make certain individuals rely on good evidence before adapting new techniques, while other implement new techniques with meagre scientific support. Therefore, results of randomized studies comparing laparoscopic and conventional liver surgery are urgently needed.

FOS070

TRANSFUSION OF IRRADIATED AUTOLOGOUS BLOOD FOR HEPATOBILIARY AND PANCREATIC CANCER RESECTIONS

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Introduction: Hepatobiliary/pancreas (HBP) cancer resections can result in significant blood loss and often require perioperative blood transfusion. We evaluated the feasibility of intraoperative blood salvage and irradiation as one component of a blood conservation program. Autologous blood transfusion (ABT) eliminates the risk of blood-borne viral infections, prevents alloimmunization, conserves blood bank resources, and avoids both short and long term consequences of homologous blood transfusion (HBT).

Methods: Patients at increased risk for blood transfusion (elderly patients with preoperative anemia, hypoalbuminemia, and higher ASA classification) scheduled for major HBP cancer resections at a single institution between Nov 2007 and Feb 2011 were targeted for enrolment. Shed blood was collected intraoperatively with a cell saver. Processed, salvaged blood was then irradiated and washed. Patients requiring perioperative blood transfusion preferentially received ABT, but also received HBT if indicated. Clinicopathologic data, blood processing parameters, and transfusion requirements were documented. An aliquot of salvaged, irradiated blood was submitted for cytopathology with immunohistochemistry to confirm eradication of malignant cells.

Results: Of 32 patients enrolled in the study, 18 were transfused (10 HBT ± ABT, 8 ABT only). HBT frequency was reduced by 45%. Implementation of the study protocol yielded 29 units of processed RBC from 20 patients. Mean RBC volume was 234 mL and mean processing time was 29 minutes. Cytopathology with immunohistochemistry revealed no malignant cells in the irradiated salvaged blood. Overall postoperative infection rate was 19% (7% for those receiving no transfusion, 25% for ABT only, and 30% for any HBT). After a median follow up interval of 18.5 months, 23/32 (72%) patients were alive (13 NED, 10 AWD). Of the 9 deceased patients, 7 demonstrated disease progression. There were no significant differences in clinical outcome between patient groups.

Conclusion: Transfusion of irradiated autologous blood for major HPB cancer resections appears feasible and reduces the need for HBT. In patients at increased risk for transfusion, comprehensive blood conservation strategies, including modalities such as ABT, may be of benefit and should be rigorously studied.

FOS071

INTRA AND PERIOPERATIVE CLINICAL OUTCOME FOLLOWING REPEAT HEPATECTOMY

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Introduction: Recurrence after hepatectomy for liver tumours is frequent and may be confined to the liver. Repeat hepatectomy is indicated in selected cases. The aim of this study was to clarify the perioperative outcome of repeat hepatectomy.

Methods: From January 2000 to December 2011, 515 liver resections have been performed with curative intent by at least one of the authors and were included in a prospective database. 170 hepatectomies were done for primary tumours, 229 for metastases and 116 for other tumours. The intra and postoperative parameters of 400 first hepatectomies (GrFH) were compared with those of 107 repeat hepatectomies

(GrRH), including 78 second, 25 third and 4 fourth hepatectomies. Values were expressed as mean ± SD. The Chi-square and the Students t tests were used for statistics; significance was defined as $p < 0.05$.

Results: GrFH included 244 males and 156 females aged 61.69 ± 12.40 (range 18–88) yrs; GrRH included 70 males and 37 females aged 64.10 ± 9.39 (range 37–85) yrs (p = NS). Intraoperative blood transfusions were 205.48 ± 416.53 (range 0–3300) ml and 196.70 ± 368.41 (range 0–2100) ml in GrFH and GrRH, respectively (p = NS). Duration of surgical procedure was 290 ± 120 (range 70–765) min and 323 ± 124 (range 60–785) min in GrFH and GrRH, respectively (p = 0.0124). Postoperative complications were 16.00% and 14.95% in the two groups, respectively (p = NS). There were two postoperative deaths. Postoperative hospital-stay was 11.07 ± 7.28 (range 3–72) days and 9.90 ± 4.16 (range 4–33) days in GrFH and GrRH, respectively (p = NS).

Conclusion: Repeat hepatectomy had similar perioperative results than first hepatectomy in our experience, but should be reserved to experienced liver surgeons because is usually more challenging. Surgery should remain the treatment of choice for selected patients with recurrent liver cancer.

FOS072
DOES OBESITY AND LIVER STEATOSIS IMPAIR LIVER REGENERATION AFTER PORTAL VEIN EMBOLISATION?

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Introduction: The number of overweight patients undergoing liver resection is dramatically increasing. Although the indications for preoperative portal vein embolization (PVE) are currently the same in these patients as in normal weighted patients, it is not known whether the expected liver hypertrophy (LH) following PVE could be impaired by obesity or steatosis.

Methods: From 2001 to 2010, 66 patients underwent PVE prior to liver resection. After exclusion of incomplete PVE, previous hepatectomy, metastasis in the future remnant liver (FRL) and embolization of segment IV, the study population included 42 patients and was divided into 3 groups according to patients' body mass index (BMI): 18 patients without overweight (BMI ≤ 25, group N); 9 patients with overweight (25 < BMI < 30, group S); and 15 obese patients (BMI ≥ 30, group O). The three groups were comparable in terms of time from PVE to volume assessment (p = 0.42) and number of patients receiving chemotherapy prior to PVE (p = 0.61). LH was expressed as the increase in FRL volume ratio to total liver volume before and after PVE.

Results: The median LH was 4.9% [-1.4–18.1%] for group N (median FRL before/ after PVE = 17.1/21.3%), 5.9% [1.5–12.6%] for group S (median FRL before/ after PVE = 18.2/28, 6%) and 5.8% [-5.2–18%] for group O (median FRL median before/after PVE = 18.8/25.5%), with no significant differences between groups N and S (p = 0.1) and groups N and O (p = 0.58). Six patients had hepatic steatosis greater than or equal to 30%. Comparison of this group with 36 patients without steatosis (<30%) showed no difference in terms of LH (4.7% vs. 6.1% respectively, p = 0.57).

Conclusion: Obesity and steatosis do not seem to impair liver regeneration after PVE. These results, however, require confirmation on a larger population.

FREE ORALS: CLRM – NO CLRM

FOS073
LIVER RESECTION WITH PREOPERATIVE CHEMOTHERAPY FOR ADVANCED OR AGGRESSIVE COLORECTAL CANCER METASTASES

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Introduction: Surgery in isolation may be approaching technical limits for metastatic colorectal cancer patients, but now is likely to help more patients because of success of preoperative chemotherapy (CTx) and advances in procedural technique. Here we review our treatment results of liver resection (Hx) for advanced or aggressive colorectal liver metastases using effective prehepatectomy CTx.

Methods: Data from 411 patients who underwent Hx were retrospectively analyzed. Metastases were resectable at initial diagnosis in 237 patients. Among the other 174 patients with unresectable (n = 53) or marginally resectable metastases (n = 121), 110 received prehepatectomy CTx (unresectable in 53, marginally resectable in 57). Forty-four of the 110 patients received their final prehepatectomy chemotherapy via the hepatic artery, 26 via the systemic infusion, and the other 40 both via the hepatic arterial infusion and the systemic infusion. Hx with portal vein embolization was performed in 65 patients and 2-stage Hx was performed in 38 patients.

Results: As for liver resection margin status, superior impact of R0 resection compared to R1 on survival was not confirmed in patients with unresectable or marginally resectable metastases, especially those with a favorable response to prehepatectomy CTx.

As for complete disappearing metastases during CTx, persistent microscopic residual disease or recurrence in situ were observed only in 35%.

Growth factors generally up-regulated early after liver resection for liver regeneration considered to be implicated in tumor growth and recurrence, however, in patients treated with 2-stage Hx with chemotherapy, mRNA expression of cyclin and growth factors in metastatic tumors that were resected at the first and second Hx were not significantly different.

Conclusion: Combining R1 resection and leaving in place of disappearing metastases may be a reasonable treatment strategy for patients responsive to preoperative chemotherapy. Two-stage hepatectomy did not induce tumor growth in combination with effective preoperative chemotherapy. Therefore, more relaxed consideration of the margin and disappearing metastases, and applying special technique such as a 2-stage strategy may permit extension of surgical indications for treating colorectal metastases.

FOS074
IN-SITU-SPLIT PROCEDURE – A PROMISING APPROACH TO EXPAND RESECTABILITY IN LIVER METASTASIS

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Introduction: As only one third of liver metastasis are resectable on first presentation, the hypertrophy concept using portal vein occlusion has been advocated to achieve resectability in cases of a small liver remnant. A new approach takes the concept of staged procedures further – the in-situ-split procedure is promising in inducing hypertrophy in the future remnant liver (FRL) much faster and more effective.

Methods: Between March and December 2011 five patients with irresectable liver metastasis (4 CRLM and 1 GIST) requiring extended resections with a preoperative FRL of 19.2% (range 15.5–24.6%) on 3D volumetry (MeVis Hepavision) were submitted to a two stage procedure: at first portal vein occlusion was combined with an in-situ-split procedure. Pre- and postoperative 3D volumetry with Fraunhofer MeVis HepaVision software allows to safely analyze the hypertrophy and go forward with the second stage operation.

Results: The mean time to gain a reasonable safe FRL was 24.2 days (range 10–43 days). The mean volume gain in the FRL was 97% (range 54–200%) and patients were safely resected without mortality/morbidity.

Conclusion: Our preliminary data show that the proposed strategy, though challenging, is safe and very effective in expanding resectability. We saw a much more effective and quicker gain in volume of the FRL – from our experience it is also likely that not only liver volume but also liver function in the FRL is enhanced.

FOS075

USE OF BIORESORBABLE MEMBRANES TO REDUCE ABDOMINAL AND PERI-HEPATIC ADHESIONS IN TWO-STAGE HEPATECTOMY (TSH) FOR METASTASES FROM COLORECTAL CANCER (MCRC): RESULTS OF A RANDOMIZED PHASE II TRIAL

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Introduction: TSH offers the possibility of long-term survival to selected patients whose liver metastases cannot be removed in a single procedure. However, the 2nd operation is made more difficult by adhesions arising from the 1st. Use of a bioresorbable membranes (Seprafilm®) has been shown to reduce adhesions in abdominal surgery but there is no trial assessing its use in hepatectomy. We aimed to assess feasibility and efficacy of Seprafilm® to prevent perihepatic adhesions in mCRC patients requiring TSH.

Methods: In this phase II trial patients candidates to TSH were enrolled from 8 university hospitals in France and randomly assigned (3 : 1 ratio) after the 1st hepatectomy to implantation of 4 sheets of Seprafilm® or standard management. The randomization sequence was computer generated and stratified by centre; treatment allocation was concealed by use of a web-based application. Investigators and patients were unmasked to treatment assignment. The primary endpoint was the time to achieve complete liver mobilization at the beginning of the 2nd hepatectomy. Secondary endpoints were extent and severity of adhesions and complications (CNS) rate after 1st and 2nd hepatectomies. Analysis was by intention to treat. This study is registered NCT01262417.

Results: 54 patients were assigned to Seprafilm® (n = 41) or standard management (n = 13). Positioning of the membranes was feasible in all but one patient and did not increase the rate of specific CNS after 1st hepatectomy. 30 patients from the membrane arm and 11 controls (well matched on important variables) underwent the 2nd hepatectomy. Patients in the membrane arm required 33% less time than controls to achieve complete liver mobilization (50 vs 75 minutes). The proportion of patients with extensive adhesions was reduced in the membrane arm (31% vs 55% controls), as was the rate of severe adhesions (17% vs 46% controls). The proportion of patients with one or more CNS at 2nd hepatectomy was higher in the control arm (55% vs 23% Seprafilm®).

Conclusion: In this phase II, randomized, controlled, multicenter study, use of Seprafilm® at the end of 1st hepatectomy reduced the extent and severity of adhesions and facilitated the second hepatectomy in patients with liver metastases who required a TSH. These results justify the organization of a phase III randomized trial assessing the use of Seprafilm in patients having liver surgery with a high probability of repeat hepatectomy.

FOS076

SYNCHRONOUS SURGERY FOR COLORECTAL CANCER AND LIVER METASTASES: LAPAROSCOPIC COLORECTAL RESECTION IMPROVES SHORT TERM OUTCOME. A COMPARATIVE STUDY

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Introduction: 30% of patients with colorectal cancer presents with liver metastases at diagnosis. Long-term survival is influenced by obtaining a complete removal (R0) of the primary tumor and liver metastases. Aim of this study was to assess the short-term outcome of combined resection of left colon or rectum cancer and liver metastases, comparing the results of the primary tumor resection performed laparoscopically or by laparotomy.

Methods: From January 2004 to December 2011, 93 patients underwent combined resection of colorectal cancer and synchronous liver metastases. 57 patients underwent laparoscopic colorectal resection (LPS Group), and were compared with 29 patients undergoing colorectal resection by laparotomy (LPT Group). Right colonic resections were excluded from the analysis. A further analysis was performed, including only the colonic resection.

Results: The two groups resulted comparable in terms of patients and disease characteristics, extent of liver resection, lymphadenectomy and length of surgery. Patients in the LPS Group had a significatively lower blood loss (400 mL vs 650 mL, $p < 0.001$) and rate of intraoperative transfusions (19.3% vs 47.2%, $p = 0.04$) compared to the LPT Group. LPS Group was associated with a lower postoperative morbidity (24.6% vs 44.4%, $p = 0.039$), and a shorter postoperative median hospital stay (9 vs 13 days, $p < 0.001$). Blood loss, morbidity and length of postoperative stay were not correlated to liver resection extent. The analysis of the subgroup of patients undergoing colon resection confirmed the same results.

Conclusion: Laparoscopic resection of colorectal cancer in patients undergoing simultaneous resection of liver metastases by laparotomy is associated with a reduction of blood loss, morbidity and postoperative hospital stay, without affecting the oncologic radicality.

In simultaneous resections of colorectal cancer and liver metastases, postoperative morbidity and hospital stay are mainly conditioned by the type of approach to intestinal surgery (laparoscopic or open), rather than the extent of liver resection.

FOS077

SYNCHRONOUS COLORECTAL LIVER METASTASES DON'T INFLUENCE LONG TERM SURVIVAL AFTER HEPATECTOMY

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Introduction: At the time of colorectal cancer diagnosis, 15 to 20% patients have synchronous liver metastases. Synchronous metastases may confer a poorer prognosis than metachronous metastases but this is uncertain. The aim of this study is to compare survival of synchronous and metachronous colorectal liver metastases following curative hepatectomy.

Methods: From 1995 to 2009, patients with colorectal liver metastases treated by hepatectomy with curative intent were collected and retrospectively analysed. Patients with extra hepatic metastases were excluded. A case-control study was conducted of patients who had synchronous or metachronous colorectal liver metastases. The following criteria were matched: sex, age, site and stage of colorectal tumor, number, size, and distribution of metastases, operative procedure and type of hepatectomy. Complete resection (R0) was defined by a surgical margin greater than 0 millimeter. Synchronous lesions were defined as metastases discover with the primary lesion or in the six months. Overall survival (OS) and disease-free survival (DFS) rates were compared.

Results: After matching, 258 patients were included in this study, 112 with metachronous liver metastases and 146 with synchronous liver metastases with a median follow-up of 36 months. There was no difference for mortality (2.7 vs 2.8%) and for morbidity (8 vs 11%). Complete resections were similar in the two groups (96.4 vs 96.6%). Recurrence was earlier for synchronous group compared with metachronous group (10.9 vs 13.2 months, $p = 0.037$). Five-year OS was 60% in metachronous group, compared with 46% in synchronous group ($p = 0.116$). Five-year DFS was 23% in metachronous group, compared with 21% in synchronous group ($p = 0.135$).

Conclusion: After matching according to tumor characteristics of liver metastases and even if the recurrence is earlier in the synchronous group, survivals are comparable between the two groups. Patients with synchronous colorectal liver metastases must have a curative and optimal treatment.

FOS078

PROGNOSTIC IMPACT OF POSITIVE SURGICAL RESECTION MARGINS AFTER RESECTION OF COLORECTAL CANCER LIVER METASTASES IN THE ERA OF MODERN CHEMOTHERAPY PROTOCOLS

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Introduction: The prognostic role of a positive resection margin (R1) of colorectal cancer liver metastases (CRLM) has been recently challenged. This monocentric study aims to assess the prognostic impact of a positive surgical margin after liver resection (LR) of CRLM in a population of patients treated by effective chemotherapy.

Methods: From January 2000 to December 2009, 215 patients (177 males: 62%, mean age 61 ± 11 years) underwent LR with curative intent for CRLM. Patients with residual macroscopic disease (R2 resection) and patients who had extrahepatic disease at diagnosis of CRLM were excluded. LR was considered as R1 (margin <1 mm) in 49 patients (33%) and R0 in 166 patients (77%). Overall, 108 (50%) patients received preoperative and 156 (72%) patients received postoperative FOLFOX or FOLFIRI chemotherapy. Patients in the R1 group had more often bilobar and larger LM ($p < 0.001$). There was no difference between the R0 and R1 groups regarding use of pre- ($p = 0.3$) and postoperative ($p = 0.4$) chemotherapy.

Results: Overall (47% vs. 40%, $p = 0.05$) and disease free (36% vs. 23%, $p = 0.006$) 5-year survival rates were significantly lower in the R1 group. Recurrence occurred in 152 patients (71%) and was significantly higher (84% vs. 67%, $p = 0.02$) in the R1 group. On multivariate analysis, the N+ stage of the primary colorectal tumor ($p = 0.008$), the presence on the pathologic specimen of at least one CRLM undetected prior to LR ($p = 0.04$), and a R1 resection margin ($p = 0.03$) were negative predictors whereas use of postoperative chemotherapy ($p = 0.03$) was a favorable predictor factor of overall survival. Use of postoperative chemotherapy ($p = 0.03$) was the only independent predictive factor of disease-free survival.

Conclusion: In the era of modern chemotherapy a positive surgical resection margin, remains a significant poor prognostic factor of survival after LR of CRLM. Postoperative chemotherapy reduces recurrence rates after R1 resection of CRLM.

FOS079

PATTERN OF RECURRENCE FOLLOWING NON-ANATOMICAL RESECTION FOR COLORECTAL LIVER METASTASIS

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Introduction: Non-anatomical resection (NAR) for colorectal liver metastasis (CRLM) has become more common in an attempt to preserve liver parenchyma. Pattern of recurrence (POR) following NAR has been reported previously, but there has been no detail on the hepatic recurrences with respect to previous NAR. We aim to investigate pattern of hepatic recurrence in patients who underwent NAR for CRLM, especially looking at the recurrences in the context of previous resected segment.

Methods: 1580 CRLM resection were performed in our centre between 1993–2010. 591 (37.4%) were NAR and 989 (62.6%) were AR. Patients who underwent simultaneous Anatomical Resection (AR) were excluded (95 out of 591 patients). All NAR were grouped as either unilobar or bilobar metastatectomy and POR studied in relation to previous resected segment.

Results: 495 NAR were included. There were 291 recurrences (58.7%). 188 were hepatic (37.9%) and 103 extrahepatic (20.8%). In 11 patients with hepatic recurrence, data was not available for recurrence segment and therefore excluded from POR analysis. The POR following unilobar metastasectomy (n = 127): same segment (n = 32, 25.2%), same sector (n = 9, 7.1%), ipsilateral hemi-liver (n = 48, 37.8%), contralateral hemi-liver (n = 15, 11.8%) and bilobar (n = 23, 18.1%). The POR following bilobar metastatectomy (n = 50): same segment (n = 1, 2%), hemi-liver with equal number of segments resected previously (n = 15, 30%), hemi-liver with lesser involved segments previously (n = 7, 14%), hemi-liver with more segment involved previously (n = 10, 20.0%) and bilobar (n = 17, 34.0%).

Conclusion: This retrospective study shows that following unilobar CRLM resections, 70.0% recur in the ipsilateral hemi-liver. In bilobar resections, 22.0% recur in the same segment or hemi-liver with previous multiple resections. Our data supports a more aggressive approach for unilobar disease. Further studies need to be done on pattern of recurrences in patients undergoing parenchyma preserving surgery to develop best surgical strategies.

FOS080

ANATOMIC VERSUS NONANATOMIC RESECTION OF COLORECTAL LIVER METASTASES: A COMPARISON OF SURGICAL AND ONCOLOGICAL OUTCOMES

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Introduction: Non-anatomic resections (NAR) for colorectal liver metastases (CRLM) have become increasingly common in an attempt to increase resection rates and to enable parenchyma-preserving resections. Some investigators, however, have reported NAR to be associated with higher rates of resection margin positivity and poorer long-term survival than anatomic resections (AR). The aim of this study was to compare surgical outcomes, recurrence and survival in patients treated with NAR and AR.

Methods: Patients undergoing hepatic resection for CRLM between January 2002 and December 2008 were identified from a prospectively maintained database. Patients were divided into two groups: those who underwent AR and those who underwent NAR. Patients who underwent simultaneous AR and NAR were excluded from analysis. Clinicopathological variables and perioperative outcomes, as well as long-term disease-free and overall survival were compared between the AR and NAR groups.

Results: Over the study period 91 patients underwent AR and 77 patients underwent NAR. Perioperative (90-day) morbidity, major morbidity and mortality occurred in 25.0%, 8.3% and 1.8% of cases respectively. There was no significant difference in rates of perioperative morbidity, major morbidity or mortality according to resection type (all $P > 0.30$). There was also no difference in the incidence of positive resection margins between resection types ($P = 0.413$). Overall survival was 48.5% and 36.6% at 3 and 5 years respectively, with disease-free survival of 31.4% and 25.3% at 3 and 5 years respectively. Type of resection was not associated with any significant difference in overall ($P = 0.430$) or disease-free survival ($P = 0.625$) following metastasectomy.

Conclusion: AR is not superior to NAR in terms of perioperative risk, tumour clearance, time to recurrence or long-term survival following metastasectomy. NAR should remain an integral component of the surgical treatment of CRLM and may enable increasing rates of operability. Furthermore, the preservation of hepatic parenchyma by NAR may enable a larger proportion of patients subsequently developing recurrent metastatic disease to undergo repeat metastasectomy.

FOS081

THE PROGNOSTIC FACTORS IN PATIENTS WHO UNDERWENT HEPATIC RESECTION OF COLORECTAL LIVER METASTASES IN THE ERA OF EFFECTIVE CHEMOTHERAPHY

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Introduction: Hepatic resection has only guaranteed long-term survival in patients with colorectal liver metastasis (CRLM) even in the era of effective chemotherapy. The definite role of neoadjuvant chemotherapy (NCT) is to down-stage unresectable CRLMs to resectable CRLMs, but it has not been elucidated for initially resectable CRLMs (IR_CRLMs).

Methods: We reviewed 226 patients for IR_CRLM from 2003–2008. Of all patients, 10% had more than 4 nodules, 11% had tumors larger than 5 cm, and 61% noted synchronous CRMLs. Among these patients, 20 patients (Group Y) underwent NCT, and 206 (Group N) did not according to the physician's preference. The median follow-up duration was 34.1 months.

Results: Initial surgical plans were changed after NCT to further resection in 20% and to limited resection in 10% of 20 patients. Complication rates of Groups Y (30%) were indifferent from Group N (23%) ($p = 0.233$), but intraoperative transfusions were more frequent in Group N (15%) than in Group Y (5%) ($p = 0.006$). There was one hospital mortality. Disease-free survival rates in Groups Y and N were 23% and 39%, respectively, and patient survival rates were 42% and 66% ($p > 0.05$). By multivariate analysis, old age (>60), differentiation of primary tumor (poorly/mucinous), resection margin involvement, and no adjuvant chemotherapy were associated with poor patient survival; the number of CRLMs (>4) was associated with poor disease-free survival.

Conclusion: NCT had no positive impact on survival but no negative impact, even saving intraoperative transfusion, was observed on the operative outcome in IR_CRLM. Further study is required to elucidate the role of NCT for IR-CRLMs.

FOS082

ADJUVANT CHEMOTHERAPY AFTER RESECTION OF COLORECTAL LIVER METASTASES IN PATIENTS AT HIGH RISK OF HEPATIC RECURRENCE: A COMPARATIVE STUDY BETWEEN HEPATIC ARTERIAL INFUSION OF OXALIPLATIN AND MODERN SYSTEMIC CHEMOTHERAPY

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Introduction: After curatively-intended surgery for colorectal liver metastases (CRLM), liver recurrences occur in more than 60% of patients, despite the administration of adjuvant systemic chemotherapy. The aim of this study was to assess the benefit of combined adjuvant hepatic arterial infusion (HAI) and intravenous (IV) 5-FU compared to standard modern adjuvant IV chemotherapy in patients at high risk of hepatic recurrence.

Methods: From January 2000 to December 2009, the 98 patients who had undergone curative resection of at least four CRLM, were selected from a prospective database. Among them, 44 (45%) had received postoperative HAI combined with systemic 5-FU (HAI group) and 54 (55%) 'modern' systemic chemotherapy (IV group).

Results: The two groups were similar in terms of age, gender, the stage of the primary, and preoperative chemotherapy. The median number of HAI cycles per patient was 7 [range, 1 to 12]. Twenty-nine patients (66%) had received at least six cycles of oxaliplatin HAI. After a median follow-up of 60 months [51–81], 3-year disease-free survival (DFS) was significantly longer in patients in the HAI group compared to those in the IV group (33% vs. 5%, $p < 0.0001$), and 3-year overall survival was slightly higher in the HAI group (75% vs. 62%, $p = 0.17$). In the multivariate analysis, adjuvant HAI chemotherapy and an R0 resection margin status were the only independent predictive factors for prolonged DFS.

Conclusion: Postoperative HAI oxaliplatin combined with systemic chemotherapy after curatively-intended surgery of CRLM is feasible, and may significantly improves DFS of patients at high risk of hepatic recurrence compared to adjuvant modern systemic chemotherapy alone. These results should be confirmed in a randomized study.

FOS083

TREATMENT STRATEGIES FOR COLORECTAL LIVER METASTASES – SPECIALIST VS. NON-SPECIALIST DECISION MAKING

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Introduction: Improved surgical technique and better chemotherapeutic manipulation of metastatic disease has increased the number of patients eligible for potentially curative resection of colorectal liver metastases. The rapid evolution in this field suggests that non-specialist decision-making may lead to inappropriate management. This study aimed to assess the management of colorectal liver metastases by non-liver surgeons.

Methods: All patients treated with palliative intent chemotherapy for metastatic colorectal cancer at a regional oncology centre between 1st January 2009 and 31st December 2009 were identified from a prospectively maintained local

database. One hundred and ten patients were treated with palliative chemotherapy, of whom 53 had liver only disease and had not been reviewed by a specialist liver surgeon. One scan was excluded as all reviewers felt it to be of insufficient quality to assess. Six resectional liver surgeons blinded to patient management and outcome reviewed pre-treatment imaging and assigned each scan a score based on their own management choice.

Results: 63.9% patients were considered potentially resectable, with a high level of inter-observer agreement (k = 0.577). When individual approach to management was considered, inter-observer agreement was less marked (k = 0.378).

Conclusion: Non-specialist management of patients with colorectal liver metastases can lead to patients being denied potentially curative treatments. Management of these patients must involve a specialist liver surgeon to ensure appropriate management.

FOS084
COMPLETE RESPONSE BY IMAGING TO PREHEPATECTOMY CHEMOTHERAPY IN TREATING ADVANCED LIVER METASTASES FROM COLORECTAL CANCER

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Introduction: Recent advances in procedural technique and chemotherapy (CTx) now allow many metastatic colorectal cancer patients to have safe, potentially curative surgery. Although increasing numbers of patients (pts) with colorectal liver metastases undergo surgical resection with preoperative CTx, much uncertainty still persists, especially whether the site of metastases that have disappeared from preoperative images should be included in a resection or can be left in place.

Methods: Eighty-six pts with marginally resectable and unresectable colorectal liver metastases, who underwent CTx and hepatectomy (Hx) between 1998 and 2009 were included. Numbers of metastases were 1 in 12 pts, 2 in 5 pts, 3 in 3 pts, and 4 or more in 66 pts; the median number of metastases at diagnosis was 6 (range, 1 to 29). Forty-four pts received their final prehepatectomy CTx via the hepatic artery, 15 via the systemic infusion, and the other 27 both via the hepatic arterial infusion and the systemic infusion.

Results: Imaging showed 616 metastases before treatment in the 86 pts included in this study. Among these, 91 disappeared from images after CTx. Excluding 14 of these treated with ablation, microscopically persistent metastases or recurrences in situ were observed only in 27 (35%). Recurrence occurred at a median of 12 mo after Hx in 8 of the pts with 14 recurrent metastases in situ where complete response (CR) lesions were left in place, however, more than half of these pts had a synchronous hepatic recurrence at another site.

When outcomes were compared between those in pts with some CR lesions left in place and others with all CR metastases being resected, no difference in overall survival was confirmed.

Conclusion: Sites of metastases that have disappeared by imaging after prehepatectomy chemotherapy should be left in place. Such a treatment approach may permit extension of surgical indications and may improve long-term survival in treating colorectal cancer liver metastases.

FOS085
IMPACT OF PORTAL VEIN EMBOLIZATION ON SURVIVAL AND LIVER RECURRENCE AFTER RIGHT (±EXTENDED) HEPATECTOMY FOR COLORECTAL METASTASES

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Introduction: Portal vein embolization (PVE) is a safe and effective procedure to increase future remnant liver before major hepatectomy and resect patients otherwise unresectable. However several studies about the impact of PVE on oncologic outcome after liver resection for colorectal liver metastases (CRLM) have been published with controversial results. Aim of this study was to assess the effect of PVE on long-term outcome and on intrahepatic recurrence rate after hepatectomy for CRLM.

Methods: Between 1998 and 2010, 100 patients underwent right (±extended) hepatectomy for CRLM. Patients who underwent two-stage hepatectomy were excluded from this analysis. Of these 100 patients, 20 (group A) underwent PVE before surgery and 80 underwent liver resection without PVE. Among these 80 patients, 20 were selected as the control group (group B), by matching with patients of group A for clinical features.

Results: The two groups were well matched by number and size of tumors and temporal relationship of CRLM (synchronous vs. metachronous). Rate of R0 resection was 80% in both groups. After a mean follow-up of 36 months (range 5–154), the 5-year overall survival rates were 43.9% in group A and 40.5% in group B (p = 0.68). The disease-free survival rates were 28.1% in group A and 26.2% in group B (p = 0.64). The intrahepatic recurrence rate was not significantly different in the two groups (45% in group A vs. 40% in group B; p = 0.74). The 5-year specific liver disease-free survival was 50.7% in group A and 51.5% in group B (p = 0.71).

Conclusion: This study showed that PVE did not negatively impact oncologic outcomes of patients with CRLM undergoing hepatectomy. Moreover, rate of intrahepatic recurrence following liver resection was not influenced by preoperative PVE.

FOS086

RIGHT AND EXTENDED RIGHT HEPATIC TRISECTIONECTOMY – SHORT AND LONG TERM OUTCOMES OF 332 RESECTIONS

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Introduction: Despite advances in surgical and anaesthetic techniques made over the last 2 decades, right hepatic trisectionectomy (RHT) is still a challenging procedure associated with higher rates of morbidity and mortality. Some patients may even require further extension of the resection to include part of segments II/III to achieve clearance (extended right hepatic trisectionectomy, ERHT). Aim of the study was to assess and compare the early and long-term outcomes of RHT and ERHT in our Unit.

Methods: From January 1993 to December 2010, 252 RHT and 80 ERHT were performed (n = 332). Resection for colorectal liver metastases (CRLM), hepatocellular carcinoma, cholangiocarcinoma and other aetiology were 127, 43, 25 and 57 for RHT and 60, 3, 2, 15 for ERHT respectively. Mean age was 58.3 vs 57.9 and 57.1% vs 55% were males (RHT vs ERHT, p = NS). There were 61 caudatectomy in the RHT group and 15 in the ERHT (p = 0.36, NS); vascular resection (Inferior vena cava or portal vein) was performed in 61 and 10 cases (p = 0.18, NS), biliary reconstruction was performed in 75 and 7 cases (p = 0.01) and total vascular exclusion was necessary in 26 and 6 cases respectively (p = NS). The amount of functional hepatic remnant was based on intra-operative judgement.

Results: There were 23 in-hospital deaths (6.9%, RHT: 19, ERHT: 4; p = NS). Overall morbidity was 44% (RHT) and 47.5% (ERHT). Bile leak (17 vs 3), haemorrhage (14 vs 4), sepsis (33 vs 9), cardio-vascular events (12 vs 1) and renal failure (12 vs 3) did not differ among the two groups (RHT vs ERHT; p = NS). There were 42 (12.6%) post-hepatectomy liver failure (according to "50 : 50 criteria"): 23 in the RHT group and 19 in the ERHT group respectively (p = 0.001). Mean hospital stay was 15.8 vs 17.1 days (RHT vs ERHT, p = NS). In the CRLM cohort, 1, 5 and 10 year survival was 78%, 47% and 39% vs 79%, 47% and 37% (RHT vs ERHT, p = 0.93, NS). Median survival was 49 and 43.9 months respectively (p = NS) and median follow-up was 59.7 and 56.5 months (RHT vs ERHT).

Conclusion: RHT and ERHT are a major undertaking with significant morbidity and mortality but represent the only chance of cure in selected patients. Liver failure is higher in the ERHT group but does not translate in increased mortality. Long-term survival in CRLM is achievable and does not differ among the two groups. Extensive liver resections even beyond conventional boundaries should not be considered an absolute contraindication to surgery.

FOS087

CAN PET-CT PREDICT OUTCOME IN COLORECTAL LIVER METASTASES?

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Introduction: PET-CT scanning, in the detection of colorectal liver metastases, has been shown to detect extra-hepatic disease, and thus reduce the rate of futile laparotomies. PET-CT can also assess metabolic activity of tumours by standard uptake value (SUV), along with other dimensional data. This study aimed to assess the role of PET-CT in predicting outcome and survival in patients with colorectal liver metastases.

Methods: Patients with potentially resectable colorectal liver metasatses, from 2007–2009, were identified retrospectively. Survival from PET-CT staging to date was calculated, as recorded by the Northern Ireland Cancer Registry. The effect on survival from the date of PET-CT, of the number of lesions, maximum diameter, standard uptake value – SUVpeak, SUVmax and SUVmean, and reconstructed volume on PET-CT was calculated. The proportion of patients was expressed as a percentage, with continuous variables expressed as mean (±SD) values. Kaplan-Meier analysis was used, with a p value of 0.05 considered statistically significant.

Results: 79 patients were identified, 8 were excluded due to incomplete data. The mean age was 64.8 years (±11.1), with 47 males. There was a strong trend for the reconstructed tumour volume on PET-CT to influence outcome (p = 0.027). The metabolic activity of the tumour as measured by SUVmax and SUVmean (p = 0.076, and 0.054 respectively) showed a trend towards significance for survival, while SUVpeak failed to predict outcome (p = 0.236). Maximum tumour diameter was also not shown to influence outcome (p = 0.119). Biochemical parameters including CEA, fibrinogen, platelets and liver function tests, and primary tumour pathology were not found to influence outcome.

Conclusion: The metabolic activity of colorectal liver metastases (SUVmax and SUV mean) as assessed by PET-CT along with reconstructed tumour volume were found to influence survival. Interestingly SUVpeak did not influence outcome. Further larger prospective studies are required to validate this further.

FOS088

PROGNOSTIC FACTORS INFLUENCING SURVIVAL AFTER LIVER RESECTION FOR COLORECTAL METASTASIS

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Introduction: A variety of factors have been identified in the literature which influence survival following resection of colorectal liver metastases (CRLM). The aim of this study was to identify those factors which influence survival in patients undergoing resection of CRLM in a UK centre.

Methods: All patients having liver resection for CRLM during an 11 year period up to 2011 were identified from a prospectively maintained database and relevant clinical data retrieved from case records. Prognostic factors analysed included tumour size (>5 cm or <5 cm), lymph node status of primary tumour, margin positivity R1 (<1 mm) or R0, neo-adjuvant chemotherapy (for liver), tumour differentiation, number of liver metastasis (4 or more), preoperative CEA (>200 or <200) and whether metastases were synchronous (i.e. diagnosed <12 months) or metachronous to the primary tumour. Overall survival (OS) was compared with Kaplan Meier plots, log rank test. Multi-variate analysis was performed using Cox regression model (SPSS vs 19). $p < 0.05$ considered significant.

Results: 432 patients underwent resection of CRLM during this period (67% male; mean age 64.5 years). The overall 5 year survival in this series was 43%. A pre-op CEA > 200 was present in 10% of patients and was associated with a poorer 5 year OS (24% vs 45%; $p < 0.001$). A resection margin <1 mm was present in 16% of patients and this had a negative impact on 5 yr OS (15% vs 47%; $p < 0.001$). Tumor differentiation, number, size, presence of biliary or vascular invasion, relationship to primary disease, nodal status of primary, or the use of neoadjuvant chemotherapy had no impact on OS. Multi-variate analysis identified only the presence of a positive resection margin (OR 1.75; $p < 0.05$) and a pre-op CEA > 200 (OR1.88; $p < 0.01$) as independent predictors of poorer OS.

Conclusion: Despite the wide variety of prognostic factors reported in the literature we were only able to identify a pre-op CEA > 200 and the presence of tumour within 1 mm of the resection margin as being of value in predicting survival. These variables are likely to identify patients who may benefit from intensive follow-up to enable early aggressive treatment of recurrent disease.

FOS089
RUSSIAN EXPERIENCE IN MANAGEMENT OF METASTATIC COLORECTAL CANCER PATIENTS IN COMPARISON WITH GLOBAL DATA ACCORDING TO LIVERMETSURVEY DATABASE

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Introduction: The aim of the study was to analyze epidemiologic and treatment-related data in the surgical and therapeutic management of metastatic colorectal cancer (MCC) patients (pts) of a academic surgical center and federal medical center under conditions of routine clinical care in comparison with global data according to LiverMetSurvey (LMS) database. By analyzing our data in relation with data of LMS we aimed at providing an instrument of internal quality control at our institutions.

Methods: We retrospectively analyzed prospectively gathered data of liver metastatic colorectal cancer patients treated at Russian academic surgical center (ASC) and at a federal medical center (FMC) in comparison with global data according to LiverMetSurvey. From 06/2006 to 12/2010, a total of 367 liver MCC pts (239 pts in ASC and 128 pts in FMC) were treated. To 12/2010 in LMS 14973 pts were registered.

Results: In comparison with the LMS cohort there was a trend to the younger age at the first operation (median LMS 60–70 vs 50–70 yrs in Russia). Also there was a higher proportion of bilobar disease and disease with ≥5 mts with size >50 mm in the FMC (n > 5 30% vs LMS 15%; size > 5 cm 55% vs LMS 20%). There was no difference in rate of extrahepatic disease. In the FMC there were more pts with initially resectable disease (98%) and therefore lower proportion of pts treated chemotherapeutically preoperatively (1%). It was registered the increasing rate of major hepatectomy in comparison the LMS (53%) to ASC (64%) and to FMC (78%). 1-year survival was significantly lower in the FMC (LMS 92%; ASC 96%; FMC 82%). Other survival end-points are not reached yet.

Conclusion: Data of LiverMetSurvey are useful and effective tool of internal quality control. The differences in disease stage at the time of liver resection and the shortage of preoperative chemotherapy may be responsible for the low 1-year survival rate in the federal medical center. Further detailed comparison could be the base for the possibility to influence on government structures for supporting effective but very costly strategy of multidisciplinary treatment.

FOS090
SHOULD PATIENTS WITH PERITONEAL CARCINOMATOSIS OF COLORECTAL ORIGIN WITH SYNCRONOUS LIVER METASTASES BE TREATED WITH CURATIVE INTENT? A CASE-CONTROL STUDY

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Introduction: This aim of this case-control study was to assess the prognostic impact of the presence of liver metastases (LM) in patients operated on colorectal peritoneal carcinomatosis (PC) who underwent complete cytoreductive surgery (CRS) and LM resection followed by intraperitoneal chemotherapy.

Methods: From a prospectively maintained database, all patients with colorectal PC and synchronous LM who underwent CRS followed by intraperitoneal chemotherapy, were manually matched to all identical patients with isolated PC, operated on over the same period, on the following matching criteria: age, peritoneal cancer index (PCI), site of the primary colorectal cancer (colon or rectum), lymph node involvement on the primary colorectal cancer specimen (pN), and postoperative chemotherapy.

Results: From 1993 to 2009, 37 patients with PC and LM were matched to 61 patients with isolated PC. After a mean follow-up of 36 months, 3-year overall (OS) and disease free survival rates were significantly lower in patients with PC and LM, respectively 40% and 66% ($p = 0.04$) and 6% and 27% ($p = 0.001$). In Cox regression analysis, PCI ≥ 12 (Odds-ratio (OR): 4.6), pN+ status (OR: 3.3), no adjuvant chemotherapy (OR: 3.0) and presence of LM (OR: 2.0) were identified as independent factors of poor OS. Thus, 3 groups

could be identified: 1) patients with a low PCI (<12) and no LM (OS of 76 months); 2) patients with a low PCI (<12) and 1 or 2 LM (OS of 40 months); and 3) patients with a high PCI (≥12) or patients with ≥3 LM (OS of 27 months).

Conclusion: This first case control study confirms that prolonged survival can be achieved in highly selected patients operated on limited carcinomatosis and liver metastases less than 3. When the peritoneal and the liver involvement are greater, the complete surgical treatment followed by intraperitoneal chemotherapy should be discussed according to criteria of aggressiveness of the tumor disease.

FOS091
LAPAROSCOPIC LIVER SURGERY OF SOLID TUMORS. INITIAL EXPIERIENCE

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Introduction: Worldwide there are an increasing number of publications in Laparoscopic Liver Surgery (LLS), some of them coming from South America. There have been several obstacles to the widespread use of LLS, mainly to the difficulty of reproducing maneuvers of open resection, fears of uncontrollable hemorrhage, and in the non-developed country lack of adequate laparoscopic equipment. The aim of the present communication is to describe the initial experience in laparoscopic liver surgery of solid tumors.

Methods: From a prospective database, it included patients who underwent to LLS of solid tumors between Jan 08 and Nov 11. It excluded lesions that need major hepatectomy, nodules close to main vessels, and unable to achieve R0 in malignant tumors. The following variables were taken into account: indication of LLS, number, size and location of tumors, Pringle maneuver, operative time, conversion rate, length of stay, morbidity-mortality and long term outcomes. The performed procedures were: laparoscopic ligation of portal vein with/without combined treatment (LLPV), laparoscopic radiofrequency ablation (LRFA), laparoscopic liver resection: pure or hand assisted (LLR or HA-LLR). Complications were stage according with the Dindo-Clavien classification.

Results: 24 patients were attempted to undergo LLS (applicability 23.5%). There were 2 LLPV, 3 LRFA, 16 LLR, and 3 HA-LLR. The conversion rate was 21%. Of the LLR, 6 had benign lesions, 1 HCC, 2 non-colorectal non-neuroendocrine liver metastases (NCNN), and 10 colorectal liver metastases (CLM). The mean operative time was 150 min (80–240). In 63% portal clamping was performed. There were 16 non anatomic and 3 anatomic resections. The median length of stay was 8 days (1–49). There were no mortality and 7 morbidities (32%). One of the LLVP died of progression of disease and 1 is alive with recurrence. One of the NCNN died of no cancer related dead. The resected HCC are still alive with no recurrence. 2 patients with CLM died of progression of diseases.

Conclusion: Laparoscopic approach in liver surgery is starting to gain acceptance.

Ligation of main portal vein lobe plus combined treatment in the remaining liver performing by laparoscopy as part of the two stage hepatectomy, avoid one laparotomy shortening the recovery times.

LRFA allowed a good positioning of the needle with the possibility of multiples shut and the overlapping of the lesions, reducing the recurrence rate and the incidence of bleeding doing the puncture by direct vision.

FOS092
OUTCOME OF LAPAROSCOPIC LIVER RESECTION COMPARED TO OPEN TECHNIQUE

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Introduction: To our knowledge no prospective randomized controlled trial has ever been reported to compare laparoscopic and open liver resections. Feasibility, safety, pros and cons of LLR compared to open surgery remains controversial. In this study, we investigate safety, practicality, and feasibility of Laparoscopic liver Resection (LLR) for different liver pathologies.

Methods: Retrospective, IRB approved, chart review of 465 liver resections performed between July 1993 and January 2011 was conducted. Patients with laparoscopic liver resection (G-I, N = 73) were compared to a matched cohort (demographics, type, size of liver pathology and extent of liver resection) (G-II, N = 73) from our total liver resection's pool. Demographic data and pathologic findings were comparable in both groups. In each group, 24 patients had malignant pathology. Comparison were made with respect to their OR time, estimated blood loss (EBL), blood transfusion (BT) requirement, complication rate, achievement of malignancy free resection margins (R-0), morbidity, mortality, length of stay (LOS), recurrence and survival.

Results: OR time was significantly lower in G-I compared to G-II (160 vs. 256 min, $P < 0.05$). There was only one perioperative mortality in G-I. EBL was lower in G-I compared to G-II (185.4 vs. 790.8 mls, $P < 0.05$). 8 patients in G-I vs. 26 patients in G-II required BT ($P < 0.05$). 15 patients in each group had postoperative complications. Average LOS was significantly less in G-I than G-II (5.32 vs. 8.57 days, $P < 0.05$). R-0 resection was achieved in 91.7% of the malignant lesions in G-I and 95.8% in G-II. Five year survival in the patients with malignant pathology was similar in both groups ($P = 0.64$). Hazard regression analysis showed malignancy, presence and type of complications to be independent predictors of mortality within the 5 years post operation.

Conclusion: The goal of any curative excision is to achieve R-0. We achieved this goal equally in both groups. Long-term outcome was equal regardless of the surgical approach. In this study, laparoscopic liver resection compared favorably to open resection with regards to OR time, LOS and need for BT. Malignant pathology, presence and type of complications are independent predictors of mortality within the 5 years post operation period.

FOS093

FAST-TRACK LIVER SURGERY – WHAT INFLUENCES LENGTH OF STAY?

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Introduction: The 'fast-track' approach to perioperative care in major abdominal surgery is well recognised in elective bowel surgery, the primary goal being to reduce in-hospital length of stay. Its role in liver resection is less established, in our unit, a multi-factorial fast-track approach has evolved. We asked whether length of stay (LOS) following liver surgery for colorectal liver metastases (CRLM) has reduced in our unit over time and if so, what clinical and operative factors have influenced this.

Methods: 1609 consecutive hepatic resections for CRLM in a single centre from 1987 to 2011 were included in the study. Using the SPSS 'Binning method', the total number of resections were divided in three chronological groups: T1 (03/1987 to 09/2001), T2 (10/2001 to 07/2006) and T3 (08/2006 to 10/2011). The LOS for each patient was categorised into one of two groups, depending on whether it was below the overall median LOS or not. The clinical and operative factors that influenced LOS were analysed using firstly a univariate analysis and then multinominal logistic regression analysis (MLRA), for both adverse and beneficial effects.

Results: There were 537, 536 and 536 resections in T1, T2 and T3 respectively. The overall median LOS was 8 days. There was a significant reduction in LOS over time, with 83 resections (15%) staying less than 8 days in T1, compared with 298 (56%) and 377 (70%) in T2 and T3 respectively ($p = 0.001$). MLRA showed that major resection (Odds ratio [OR] = 3.16, $p = 0.001$), additional surgery (OR = 1.72, $p = 0.001$), blood loss (OR = 1.00, $p = 0.03$) and complications (OR = 4.08, $p = 0.001$) adversely affected LOS, with LOS increased by the value of the OR of the variable. In contrast, previous liver surgery (OR = 1.36, $p = 0.036$) and surgery in T3 (OR = 2.35, $p = 0.001$) were associated with a reduced LOS (by the OR of the variable). Patient age and ASA did not affect LOS.

Conclusion: In our unit, liver surgery within the last five years (T3), when a more focused fast-track approach was adopted, is associated with a significant reduction in LOS. Furthermore, meticulous surgery, with low blood loss and morbidity are integral to any enhanced-recovery programme, as our data confirms that factors associated with surgery, rather than patient factors, are what matters.

FOS094

COLORECTAL LIVER METASTASES IMAGING STUDY (CLIMAX)

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Introduction: The role of imaging in colorectal cancer liver metastases management is crucial to offer the best treatment, and the longer survival rates.

Intraoperative ultrasound has been the standard in surgical decision making in oncologic liver surgery, but since preoperative imaging techniques have improved in recent years the importance of IOUS might be changed.

At the same time there is no yet consensus on which is the most accurate whole-body imaging technique for metastatic colorectal cancer.

Methods: A single-centre prospective study was performed on 51 patients undergoing preoperative imaging with FDG PET/CT, CT scan, MR liver, intra-operative ultrasound (IOUS) and surgical treatment for colorectal cancer liver metastases.

Pre-operative and intra-operative metastatic disease detection was compared with histological findings. We analyzed and compared number of liver metastases, number and localization of extrahepatic metastatic deposits, AJCC/UICC stage, number of new lesions identified intraoperatively and interval time among preoperative imaging modalities and surgery.

Cohen's Kappa test was used as measure of agreement among preoperative imaging, intraoperative findings and histology.

Results: Concordance between the number of liver metastases identified with imaging and histology showed moderate concordance for CT scan: K: 0.490 (95% CI: 0.28–0.69), moderate concordance for MR scan K: 0.546 (95% CI: 0.34–0.74), good concordance for FDG PET/CT K: 0.680 (95% CI: 0.48–0.87), very good concordance for IOUS K: 0.882 (95% CI: 0.77–0.99).

Despite the use of a complete preoperative imaging, new metastatic liver lesions were identified intraoperatively in 5/51 (9.8%) patients with IOUS.

Presence of extrahepatic metastatic colorectal cancer disease was identified in 23.52% of the patients. FDG PET/CT identified intrabdominal lymph nodal metastatic disease in 15.68% of patients, none of these lesions was diagnosed with CT scan.

Conclusion: Our study compares for the first time the agreement of all the main preoperative (CT, MRI, PET/CT) and intraoperative imaging modalities with histology results, showing that IOUS remains the most sensitive scan for the detection of CRCLM.

According to our results PET/CT showed higher sensitivity in detection of colorectal cancer extrahepatic metastatic disease than CT scan and should be considered the modality of choice for the best preoperative staging, as previously described in literature.

FOS095

COMBINED USE OF INTRAOPERATIVE ULTRASOUND AND INDOCYANINE GREEN FLUORESCENCE TO DETECT LIVER METASTASES FROM COLORECTAL CANCER

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Introduction: Surgical excision is currently the method of choice for managing liver metastases from colorectal carcinoma. Achievement of R0 resection margins is a major determinant of disease-free survival rate in these patients, but the imaging techniques have limits of resolution.

In this study we evaluated a new approach for intraoperative detection of colorectal liver metastatic tissue based on the emission of indocyanine green fluorescence.

Methods: In our study we enrolled 20 consecutive patients with advanced, multinodal liver metastases from primary colorectal cancer who were eligible for liver resection. Twenty-four hours before surgery, each patient received an intravenous bolus of indocyanine green (ICG) (0.5 mg pro kg of body weight). During surgery procedures, ICG fluorescence, which accumulates around neoplastic lesions as a result of defected biliary clearance, was detected with a specifically near-infrared camera system (PDE-PhotoDynamicEye).

We recorded total number of lesions detected by PDE-ICG, intraoperative ultrasound (IOUS) and preoperative computed tomography (CT).

Results: PDE-ICG revealed a total number of 54 metastatic liver nodules confirmed by histological analysis, approximately half of which were missed on preoperative CT and/or IOUS. 32 (59%) of these nodules were seen on preoperative CT, and 38 (70%) were observed on IOUS. IOUS demonstrated quite similar to CT when dealing with nodules more than 3 mm of diameter and allowed to discover several nodules below 3 mm. However the use of PDE-IOUS increased the detection of liver tumors in a significant way, particularly discovering small nests below 3 mm.

The resected specimens were sent for pathological examination and were confirmed as metastases from primary colorectal cancer.

Conclusion: While ultrasounds are gold standard for intraoperative guidance during liver resection, it has limitations too: just a two-dimensional cross section, and the need of a considerable training and experience for a correct interpretation of the findings.

This study suggests that PDE-ICG combined with intraoperative ultrasound, could be a safe and effective tool for ensuring complete surgical eradication of liver metastases from colorectal cancer.

FOS096

DOES GADOXETIC ACID-ENHANCED MRI REDUCE THE INCIDENCE OF INTRAOPERATIVE DETECTION OF METASTATIC NEW TUMOR NODULES AND POSTOPERATIVE EARLY HEPATIC RECURRENCE IN COLORECTAL LIVER METASTASIS SURGERY?

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Introduction: Despite the improvement of preoperative imaging studies for colorectal liver metastases (CRLMs), we sometimes identify new metastatic liver nodules intraoperatively. These nodules frequently make us change operative procedures and can be a risk of early hepatic recurrence if they were not identified. Though there are several reports indicating the better detectability with Gadoxetic acid-enhanced MRI for CRLM patients, their impact on surgery is rarely evaluated.

Methods: Between 2002 and 2010, a total of 168 consecutive hepatic resections (HRs) without any preoperative treatment for target CRLMs were performed and 411 nodules were resected. We divided them into two groups, the groups S; patients preoperatively examined by superparamagnetic iron oxide (SPIO) enhanced MRI ((n = 118, 299 nodules); performed in 2002–2008), the group G; patients examined by Gadoxetic acid-enhanced MRI ((n = 50, 112 nodules); performed in 2008–2010) for preoperative imaging study. We compared the preoperative detectability, the number of NMLNs and early hepatic recurrence of each groups.

Results: Eighty-four (1–10 per one HR) NMLNs were detected in 33 (19.6%) HRs. (group S: 69 nodules in 28 HRs (23.7%), group G: 15 nodules in 5 HRs (10.0%) (P = 0.04)). Preoperative detectability was 76.9% in group S and 86.6% in group G, respectively (P = 0.03). The average of maximum diameter of NMLNs was 6.0 mm (group S; 6.2 mm, group E; 4.0 mm (P = 0.037)). In analysis of 114 nodules less than 10 mm in diameter, 70 nodules (51.8%) were NMLNs, preoperative sensitivity were 38.6% in group S and 62.2% in group G, respectively (P = 0.0001). Gadoxetic acid-enhanced MRI for preoperative examination was not the significant factor reducing early hepatic recurrence (P = 0.3, 95%CI; 0.120–2.053).

Conclusion: Gadoxetic acid-enhanced MRI could detect smaller nodules, reduce the risk of NLMNs than SPIO MRI, but could not contribute to reduce postoperative early hepatic recurrence.

FOS097

COMPARATIVE ANALYSIS OF "REVERSE" VERSUS "CONVENTIONAL" STRATEGY FOR THE SURGICAL MANAGEMENT OF SYNCHRONOUS COLORECTAL LIVER METASTASES

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Introduction: Resection of colorectal liver metastases (CRLM) prior to that of colorectal tumor (reverse strategy) has been proposed as an alternative to the conventional strategy (primary resection then CRLM). The objective of this study was to compare the results of both strategies.

Methods: From 2006 to 2008, all patients resected from synchronous CRLM were included in a prospective database. Reversed strategy was mainly considered for advanced hepatic tumor disease with asymptomatic primary and conventional one for the other patients. Groups were compared for pre- and perioperative findings then outcome after surgery. Among 111 consecutive patients surgically treated for synchronous CRLM in the 2-year period, 93 patients (72%) had a Conventional strategy and 18 patients (28%) had a Reverse strategy. A higher maximal tumor diameter was demonstrated in the Reverse group (62 ± 66 vs 32 ± 25 mm – p = 0.0034) as well as a higher rate of severe morbidity: 33% vs 12% (p = 0.003).

Results: Postoperative mortality was nil. A R0 resection was achieved in 12/18 (66%) patients of the Reverse group. After a similar follow up in the 2 groups (RS vs Conv: 24 ± 13 vs 25 ± 13 months; p = 0.76), one and 3-year overall survival were 82% and 67% in the Reverse group vs 94% and 75% in the Conventional one (p = 0.10). After R0 resection, one and 3-year recurrence-free survival were 78% and 57% vs 86% and 73% (p = 0.18), respectively. One and 3-year recurrence rate was 26% and 55% vs 34% and 61% respectively (p = 0.58).

Conclusion: The «reverse strategy» provides a similar outcome compared to conventional strategy, despite a more advanced metastatic disease.

FOS098

LAPAROSCOPIC RESECTION OF COLORECTAL CANCER FACILITATES SIMULTANEOUS SURGERY OF SYNCHRONOUS LIVER METASTASES

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Introduction: Combined resection of colorectal cancer and synchronous liver metastases (LM) still remains controversial because of the higher risk of morbidity, the oncologic results and the necessity of adequate abdominal approach for both liver and colorectal resection. Laparoscopy may be beneficial in terms of operative results and could facilitate surgically this combined procedure. To date, only very few studies have been reported, with small number of patients on the possible benefit of laparoscopy.

Methods: From 2006 to 2011, all patients with colorectal cancer and resectable synchronous LM for which total length of the procedure was less than 8 hours, underwent a colorectal laparoscopic resection with combined liver open and/or laparoscopic resection.

Results: Fifty-one patients (29 men) with a median age of 61 years (range, 29–77) underwent combined surgery including for the primary colorectal tumor procedure a laparoscopic left colectomy (n = 28), rectal resection (n = 20), right colectomy (n = 2) and total colectomy (n = 1). Synchronous liver resections included major surgery (3 or more segments removed) (n = 10, 20%) and minor surgery (n = 41). Extraction of the colorectal specimen was performed through an incision used for open liver resection, i.e. a right subcostal (n = 21), a bi-subcostal (n = 14), an upper midline (n = 9) incisions, except in 7 patients (14%) where a totally one-step laparoscopic procedure was performed. The overall conversion rate was 8% (n = 4). The 30-day mortality rate was 0%. The overall morbidity rate was 55% (n = 28), including colorectal related complications in 11 patients and liver related in 17 patients. Clinical anastomotic leakage was 12% (n = 6). Major morbidity (i.e. Dindo III-IV) rates was 25% (n = 13) related to colorectal surgery in 3 cases (anastomotic leakage) and to liver surgery in 10 cases (bile leakage with hepatic abscess). The median hospital stay was 16 days (range, 6–40).

Conclusion: This study showed that laparoscopic colorectal resection combined with open or laparoscopic liver resection for synchronous LM was feasible and safe. Moreover, laparoscopy facilitates the surgical abdominal approach for combined liver resection.

FOS099

N-ACETYLCYSTEINE ADMINISTRATION DOES NOT IMPROVE PATIENT OUTCOME FOLLOWING LIVER RESECTION

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Introduction: Post-operative hepatic dysfunction is a major cause of concern when undertaking liver resection. The generation of reactive oxygen species (ROS) as a result of hepatic ischaemia/reperfusion injury can result in hepatocellular injury. Experimental evidence suggests that N-acetylcysteine may ameliorate ROS mediated liver injury and reduce the risk of post hepatectomy liver failure (PHLF) although a beneficial clinical effect has not been conclusively demonstrated.

Methods: A cohort of 44 patients who had undergone liver resection and receiving peri-operative NAC (10 g/24 hrs)

were compared to a further cohort of 44 patients (matched for the extent of liver resection, gender, age and chemotherapy use) who did not.

Liver function tests (ALT, Alk Phos, Bilirubin and Prothrombin time) were compared on post-operative days 1, 3 and 5. Peri-operative outcome data was retrieved from a prospectively maintained database within our unit and complications graded as per the Dindo-Clavien classification. PHLF was graded according to the International Study Group of Liver Surgery guidelines.

Results: Administration of NAC was associated with a prolonged prothrombin time on the third post-operative day (18.4 s vs 16.4 s; p = 0.002) as a consequence of which there was a higher incidence of grade A PHLF (32% vs 9%; p < 0.01) in this group. The incidence of grades B and C PHLF was lower in the NAC group although this difference did not reach statistical significance (6.9% vs 14%; p = 0.287). The overall complication rate in the NAC group was lower (30% vs 43%; p < 0.05). There was one peri-operative death in the NAC group and none in the control group.

Conclusion: Despite promising experimental evidence this study was not able to demonstrate any advantage in the routine administration of peri-operative NAC in patients undergoing liver resection of 3 or more segments.

FOS100
EARLY LIVER RECURRENCE AFTER HEPATIC RESECTION FOR COLORECTAL METASTASES HAD NO IMPACT ON LONG TERM SURVIVAL

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Introduction: Despite improvements in treatment of colorectal liver metastases (CLM) with the association of surgery and chemotherapy, most patients develop early liver recurrence after hepatic resection. However, data are lacking on the effect of short time recurrence pattern on oncological outcomes. This study aimed to assess predictive factors and oncological prognosis of early liver recurrence after hepatic resection for colorectal metastases.

Methods: From 1999 to 2009, 429 patients had a liver resection for CLM. Patients with no curative liver resection or with another site of colorectal metastases were excluded. Curative resection was defined by a surgical margin greater than 0 millimetres. Recurrences occurring within 12 months after liver resection were defined as early recurrences. Oncological outcomes were analyzed according to timing of liver recurrence. Recurrence and survival were assessed by Kaplan Meier method. Univariate and multivariate analyses of factors associated with short time to liver recurrence after hepatic resection for CLM were carried out.

Results: Two hundred seventy two patients were included with a median follow up of 33 months. Patients had bilobar CLM in 42% of cases. Liver recurrence rate was 39% and two third occurred within 12 months after liver resection. Predictive factors of early recurrence were surgical margin less than 6 mm (OR = 1.65; 95%CI 1.03–2.63; p = 0.038) and radiofrequency (OR = 2.64; 95%CI 1.44–4.82; p = 0.002). Patients with early liver recurrences had less often other sites of metastatic disease compared to those with late liver recurrence. Patients with liver recurrences had a curative treatment in 41% of cases. Five years global survival was not altered by early liver recurrence compared to late liver recurrences (50% vs. 55%, p = 0.277).

Conclusion: Our results suggest that a safe surgical margin is necessary to avoid early liver recurrence after liver resection for CLM. Moreover, early liver recurrence did not affect long term survival because the recurrence was essentially in the liver allowing an iterative hepatectomy. Patients with short time to recurrence after liver resection for CLM should benefit of a curative treatment.

FOS101
TIMING OF RESECTION FOR SYNCHRONOUS LIVER METASTASES FROM COLORECTAL CANCER

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Introduction: The optimal timing of hepatic resection for synchronous liver metastases to colorectal primary is still controversial. This study aimed to determine the patient selection criteria for simultaneous resection of the colorectal primary and the liver metastases.

Methods: Among 182 patients with synchronous colorectal liver metastases (SCRLM), 71 patients were performed hepatic resection simultaneously with primary resection (simultaneous group) and 111 patients were performed hepatic resection after primary resection (metachronous group). Clinical characteristics and surgical outcomes were compared between the groups.

Results: Patients background and operative data: The proportion of patients with multiple hepatic metastases (p = 0.02) and bilobar distribution (p = 0.02), proportion of major hepatectomy (p < 0.01), preoperative chemotherapy (p < 0.01) and ablative therapy adjunct to hepatectomy (p = 0.04) was significantly greater in the metachronous resection group than in the simultaneous resection group. These two groups were comparable among the primary status of the neoplasm, duration of operation, intraoperative blood loss.

Short-term outcomes: No postoperative mortality was observed. The morbidity in the simultaneous group (34%) was higher than in the metachronous group (18%) (p = 0.02). Long-term outcomes: No significant difference in 5-year overall and disease-free survival was observed between the synchronous group (49.5% and 19.9%) and the metachronous group (42.6% and 19.2%; p = 0.96, 0.32).

In the simultaneous resection group, the volume of resected liver (more than 300 g) was selected as a risk factor for postoperative morbidity (relative risk, 1.626 [95% confidence interval, 1.030–25.091]; p = 0.046). With respect to the oncological results, multivariate analysis retained patients age (65 years or older), histologic differentiation of colorectal primary and the number of hepatic metastases (4 or more lesions) as an independent worse prognostic factors.

Among 182 patients with SCRLM, 83 patients (45.6%) were bilobar tumor distribution with 4 or more liver metastases. Of these 83 patients, 21 patients were performed hepatic resection simultaneously with primary resection (without

neoadjuvant group) and 44 patients were performed hepatic resection after primary resection with neoadjuvant prehepatectomy chemotherapy (neoadjuvant group). The proportion of patients with disease-free interval less than 6 months was significantly higher in the without neoadjuvant group (47.6%) than in the neoadjuvant group (22.7%) ($p = 0.042$).

Conclusion: A one-stage procedure appears not to be desirable for synchronous colorectal hepatic metastases for patients with 4 or more hepatic lesions and requiring resection of more than 300 g. Patients with bilobar multiple liver metastases should receive neoadjuvant chemotherapy during the interval between the colorectal primary and the liver resection.

FOS102
A PROSPECTIVE STUDY OF PRE-OPERATIVE RADIOLOGICAL INVESTIGATIONS FOR THE DETECTION OF COLORECTAL LIVER METASTASES

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Introduction: Accurate detection of colorectal liver metastases (CRLM) is paramount to aid prompt treatment. Controversy remains regarding the most reliable imaging modality, and poses a diagnostic dilemma for surgeons, oncologists and radiologists alike. This prospective study aimed to compare the findings of 3 modalities of liver specific imaging in the detection of CRLM; and assess associated long-term survival.

Methods: Consecutive patients with CRLM underwent computerised tomographic arterial portography (CTAP), magnetic resonance imaging (MRI), and positron emission tomographic scan (PET-CT). Two blinded radiologists for each modality reviewed the scans by consensus. Group 1 included those suitable for surgical resection, and radiological findings were compared with histopathology. Sensitivity, specificity, and overall accuracy for each investigation were calculated. Group 2 included patients deemed unresectable, and correlation of results between modalities were determined. Long-term survival was calculated. Ethical approval and written consent was obtained.

Results: 55 patients from September 2002 to May 2004 were included. In group 1, a yield of 87 possible abnormalities was noted. 40 were reported as metastatic by at least one modality, 28 were subsequently confirmed as metastatic by pathology. 15 were correctly characterised by all 4 modalities. MRI was the most accurate (90.6%), followed by CTAP (86.0%) and PET-CT (82.6%). MRI was also most specific (96.5%) while CTAP most sensitive (82.1%). 5-year survival was 43.7%. In group 2, 51 lesions were described as metastatic by all 3 imaging modalities, with PET-CT detecting extra-hepatic disease. Correlation of results between MRI and PET-CT was (62.1%), followed by MRI/CTAP (51.4%), then CTAP/PET-CT (35.0%). 5-year survival was 15.6%.

Conclusion: MRI provided the most accurate pre-operative assessment of colorectal liver metastases, for which there is a favourable 5-year survival. PET-CT demonstrated the ability to detect extra-hepatic disease, while CTAP overestimated the extent of hepatic disease. The combination of MRI and PET-CT appears to be the best staging strategy for colorectal metastatic patients.

FOS103
IS LIVER RESECTION JUSTIFIED FOR PATIENTS WITH LIVER METASTASIS FROM BREAST CANCER?

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Introduction: Metastatic breast cancer has become an important issue in breast cancer treatment.

Breast cancer patients developing liver metastases have traditionally been considered to show poor prognosis. The issue of choosing the appropriate treatment method is still debatable. The purpose of this study is to examine our experience with liver resection in patients.

Methods: We conducted our research targeting 2,176 patients who underwent surgery due to breast cancer in the breast cancer center in Gangnam Severance Hospital from January, 1991 through December, 2006. 100 patients had multiple-organ metastasis including the liver metastasis and 13 patients had only liver metastasis. Finally, 13 patients were retrospectively reviewed.

Results: The average age of the 13 patients was 51.1 years (±9.4 years), and all patients were female. The histological classification of the breast cancer was infiltrating breast cancer for 11 patients (84.6%), and they received an adjuvant therapy after surgery for breast cancer depending on their hormone receptor status and the stage. Synchronous detection was observed in 2 patients, and metachronous lesion detection was seen in 11 patients. The mean time interval between detection of liver metastasis and initial breast cancer treatment was 62.5 months. All patients was underwent liver resection. The medial survival time after liver resection from breast cancer was 57.9 months and 1 year and 3 year survival rates were 84.6%, 50.1%, respectively.

Conclusion: Liver resection for breast cancer liver metastases has an important role in the oncological treatment of metastatic breast cancer with excellent prognosis.

FOS104
LAPAROSCOPIC RESECTION OF COLORECTAL LIVER METASTASES DOESN'T INFLUENCE INFLAMMATORY MEDIATORS: PROSPECTIVE OPEN VS LAPAROSCOPIC TRIAL

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Introduction: Laparoscopic surgery is thought to reduce the postoperative immunologic effects of surgical trauma. The aim of the present study was to evaluate the influence of surgical trauma on inflammatory mediators.

Methods: Forty patients with resectable liver metastases of colorectal origin were assigned to laparoscopic liver resection (LLR; n = 22) or conventional open liver resection (OLV; n = 18). Blood samples were drawn preoperatively and 24 hours after resection. Commercially available ELISA methods were used for the determination of IL-6 and IL-8. From 25 patients (LLR n = 10 and OLR n = 15), the mRNA of inflammation related factors (COX-2 and MMP-9), angiogenesis related factor VEGF and HIF-1alpha in tumor tissue and normal liver parenchyma were detected by real-time RT-PCR.

Results: There were no differences in IL-6 and IL-8 levels before resection between the open and laparoscopic technique; IL-6 levels were significantly elevated in both groups at 24 hours compared to preoperative levels (p = 0.028 and p = 0.012, respectively). IL-8 levels were also increased at 24 hours in both groups, although not significantly. The expression of COX-2, MMP-9, VEGF and HIF-1alpha mRNA was not different between LLR and OLR as well as for tumor tissue as for normal liver parenchyma.

Conclusion: Immunological effects assessed by IL 6, IL 8, Cox 2, MMP-9, VEGF and HIF-1alpha are similar between open and laparoscopic procedures. Laparoscopic approach does not reduce the surgical stress in patients suffering from colorectal liver metastases.

FOS105
FACTORS INFLUENCING THE IMPACT OF CONTRAST-ENHANCED INTRAOPERATIVE ULTRASOUND DURING LIVER SURGERY FOR COLORECTAL CANCER LIVER METASTASES

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Introduction: Contrast-enhanced intraoperative ultrasound (CE-IOUS) during surgery for colorectal liver metastases (CLM) is entered in clinical practice. However, its impact seems to decrease with the improvement of preoperative imaging. Therefore, if CE-IOUS should be selectively or routinely applied remains unclear: a profile of patients who may benefit of CE-IOUS application has to be disclosed. The aim of this study is to define reliable criteria for a selective use of CE-IOUS during surgery for CLM.

Methods: One hundred and twenty-seven consecutive patients underwent liver resection using IOUS and CE-IOUS for CLM. All patients underwent preoperative CT and/or MRI within 3 weeks prior to surgery. CE-IOUS was performed by injecting intravenously 2.4 mL of sulphur-hexafluoride microbubbles (SonoVue, Bracco, Italy). Reference standards were histology and imaging at 6 months after surgery. Univariate and multivariate analyses were performed. Statistical significance was set at P = 0.05.

Results: IOUS discovered 172 additional lesions in 51 patients. CE-IOUS found 14 additional lesions not seen at IOUS in 6 patients, and confirmed all the IOUS findings. Seventy-five CLM in 36 patients appeared within 6 months after surgery. Sensitivity, specificity, positive predictive value, and negative predictive value were: 63%, 98%, 100% and 27% for preoperative imaging, 87%, 100%, 100% and 52% for IOUS, and 89%, 100%, 100% and 56% for IOUS+CE-IOUS, respectively. In 15 patients (12%) CE-IOUS allowed better definition of tumor margins thus helping in resection guidance. At multivariate analysis only the presence of multiple CLM (P = 0.014) and their isoechoic pattern at IOUS (P = 0.05) independently correlated with new findings at CEIOUS.

Conclusion: CE-IOUS may improve IOUS findings both for detection and for resection guidance. Furthermore, these results show that multiple presentation and isoechoic CLM at IOUS are reliable factors requiring the use of CE-IOUS.

FOS106
RADIOFREQUENCY ABLATION FOR LIVER COLORECTAL METASTASES

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Introduction: Aim – patients with liver colorectal metastases treatment improvement.

Methods: A total of 97 patients with liver colorectal metastases including 41 males and 56 females; age – 51.6 years (varying from 27 to 83 years) since 2002 underwent ultrasound-guided radiofrequency Ablation (RFA). All patients but three undergone primary tumor removal as the first stage and they had adjuvant therapy. Radionics Cool-Tip® Ablation System and water-cooling probe system was used for RFA. 189 RFA was performed in total, among them 165 percutaneous RFA (PcRFA) and 24 RFA with laparotomy. Mean session time (PcRFA) was 2.2 + 1.7 (from 1 to 8). Efficiency control was performed with US, MRI from first 24 hours after procedure, from 3, 5 days (US) and then from 1, 3, 6 (MRI), 12 (MRI), 18, 24 (MRI) months.

Results: An overall complication rate was 10.9% (18/165) after PcRFA and 16.6% (4/24) after RFA by open approach. Pleural effusion was the most frequent complication (42.5%). 2 patients died (2.07%) within the first two months after the procedure. In spite of chemotherapy and repeated RFA sessions 61% developed new foci during first 6 months, among them 26% intrahepatic, 34% extrahepatic and 45.8% intra- and extrahepatic. Post-RFA 1-, 2-, 3-, 4- and 5-years survival rates were 84.2%; 62.7%; 51.7%; 32.7% and 26.3% relatively. Mediana survival – 30 months.

Conclusion: Patients with liver colorectal metastases treated with RFA, as well as operatively develop different results, depending on the following prognostic factors: metastases identification period, localization, tumor nodes number and size. US and CT are less informative in RFA efficiency control comparing with MRI. Partial destruction is more frequent than progressive tumor growth. PcRFA can be performed whenever necessary. RFA, especially PcRFA, as a minimally invasive local treatment, has become an effective and relatively safe alternative for the patients with liver colorectal metastases.

FOS107

DETERMINATION OF SAFE FUTURE LIVER REMNANT RATIO PRIOR TO MAJOR HEPATECTOMY IN PATIENTS WITH COLORECTAL LIVER METASTASES

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Introduction: A multidisciplinary approach involving preoperative chemotherapy has become common practice in patients presenting with colorectal liver metastases (CLM). Data on clinically based determination of safe future liver remnant (FLR) volume in these patients is lacking. The aim of study was to identify predictors of postoperative morbidities in patients undergoing major hepatectomy after intensive preoperative chemotherapy for CLM.

Methods: Between January 2000 and August 2010, 101 consecutive patients presenting with CLM underwent major hepatectomy after preoperative chemotherapy (≥6 cycles of oxaliplatin or irinotecan regimen with or without targeted therapies) in Hôpital de Hautepierre, Strasbourg, France. Predictors of postoperative overall morbidities, sepsis, and liver failure were identified using uni- and multivariate analysis.

Results: Postoperative mortality rate was 1.0%. Fifty-eight patients had 95 postoperative complications. Sepsis and postoperative liver failure occurred in 23 (22.8%) and 16 patients (15.8%), respectively. On univariate analysis small future liver remnant (FLR) ratio (defined as FLR volume [mL]/total liver volume [mL] × 100%) was significantly associated with overall morbidity, sepsis, and liver failure. Using Receiver Operator Characteristic analysis, the cut-off for FLR ratio in predicting overall morbidity, sepsis, and liver failure was 44.8%, 43.1%, and 37.7%, respectively. On multivariate analysis each FLR ratio cut-off was an independent predictor of overall morbidity (OR; 4.85), sepsis (OR; 9.36), and liver failure (OR; 130.90).

Conclusion: This study provides the optimal FLR ratio for safe postoperative outcome after major hepatectomy in CLM patients and receiving 6 or more cycles of preoperative chemotherapy.

FOS108

TREATMENT STRATEGY FOR SYNCHRONOUS BILOBAR COLORECTAL LIVER METASTASES

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Introduction: Synchronous bilobar colorectal liver metastases (CRLM) are often recurred even after curative hepatectomy. We previously reported benefits of delayed resection for synchronous CRLM because it may reduce early recurrence caused, at least in part, by existence of micrometastases. The objective of this study is to investigate the benefits and limits of sequential resection of primary and synchronous bilobar CRLM and to also demonstrate effects of conversion chemotherapy.

Methods: We identified 362 patients who underwent initial hepatic resection (Hx) for CRLM. Among these patients, 84 patients had synchronous bilobar CRLM. Fifty two patients underwent simultaneous resection and 32 patients underwent delayed Hx. The tumor progression during interval between primary resection and Hx was determined by an identical abdominal enhanced CT. We also identified 34 patients with initially unresectable synchronous CRLM. The effect of conversion therapy using cytotoxic agents and biologics was determined. Medical records of these patients were retrospectively reviewed. Overall survival rates were evaluated by the Kaplan-Meier method. The univariate or multivariate analyses were estimated by the Cox proportional hazards models.

Results: Median/mean interval between the evaluations prior to the resection for primary tumor and Hx was 2/2.2 months. Twenty-two of the 32 (68%) patients had new detectable lesions after reevaluation. The median/mean number of metastases was not significantly different between the simultaneous and delayed Hx group. Hepatic disease-free survival after Hx was significantly different between the two groups. Multivariate analysis showed that delayed Hx, pN2, 5 or more liver mets were significant prognostic factors for survival. Among 34 patients with initially unresectable CRLM, 22 patients were converted to Hx. The overall survival was better in patients who had 20% or more tumor shrinkage at 8 weeks after conversion therapy and underwent Hx.

Conclusion: Tumor progression was recognized and occult metastases were detected after the interval reevaluation. Delayed hepatectomy may be a useful approach to reduce rapid remnant liver recurrence in synchronous bilobar CRLM. Neoadjuvant chemotherapy may be required in patients who have primary nodal metastases (pN2) or 5 or more synchronous resectable CRLM. Tumor shrinkage of 20% or more at 8 weeks after conversion chemotherapy may be a useful indicator for survival in initially unresectable CRLM.

FOS109

A POTENTIAL ROLE FOR PHARMACOGENOMICS IN DETERMINING OXALIPLATIN INDUCED TISSUE INJURY AFTER DOWN STAGING COLORECTAL LIVER METASTASIS

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Introduction: Oxaliplatin based chemotherapy has been linked to the development of sinusoidal obstruction syndrome (SOS) which can have a negative impact on outcome following resection of colorectal liver metastases.

The aim of this study was to determine what effect expression of genes involved in the transport of platinum based

drugs may have on tissue injury following exposure to Oxaliplatin based chemotherapy in a murine model of colorectal liver metastases.

Methods: Experimental colorectal liver metastases were established in C57/Bl 6 mice using the syngeneic MCA38 colorectal cancer cell line via a midline laparotomy. After 3 weeks animals were culled and RNA extracted from liver, spleen and tumour tissue. RT-PCR was then performed to determine expression of transporters associated with the uptake of platinum based drugs (CTR1 & 2) and its export from cells (ATPase 7A & 7B).

Tumour bearing or sham operated animals (n = 6 per group) were treated with either intraperitoneal FOLFOX or vehicle control weekly for 3 weeks and culled 1 day after the final dose. Drug induced tissue injury was assessed by H & E staining and chemotherapy induced DNA damage by immunohistochemistry for H2AX.

Results: Both spleen and tumour tissue demonstrated evidence of injury following treatment with FOLFOX whereas there was no evidence of liver injury. In keeping with this FOLFOX treatment was associated with an increase in the number of H2AX positive cells in both the spleen (38 vs 9 cells per HPF; $p < 0.01$) and tumour tissue (51 vs 38 cells per HPF; $p < 0.01$) but not in the liver.

All tissues demonstrated relatively high expression of CTR1 and lower expression of CTR2, a pattern that is accepted as indicating sensitivity to Platinum drugs. In contrast the liver was found to express very high levels of the ATPase 7B whereas low levels were expressed in the FOLFOX sensitive spleen and tumour tissue suggesting they are less able to remove the drug.

Conclusion: High levels of expression of ATPase 7B seem to be associated with resistance to tissue injury following FOLFOX chemotherapy.

Numerous polymorphisms have been linked to this gene potentially resulting in accumulation of both copper and platinum in certain tissues. These genetic polymorphisms could explain the variability of SOS seen in patients having liver resection for colorectal liver metastasis.

FOS110
PLANNED LAPAROSCOPIC TWO-STAGE STRATEGY FOR PATIENTS WITH MULTIPLE BILOBAR COLORECTAL LIVER METASTASES (CRLM)

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Introduction: Two-stage hepatectomy (TSH) represents a valuable option for CRLM otherwise not amenable to curative resection. Laparoscopic liver surgery has been demonstrated as a safe and effective approach respecting oncological principles and results. The purpose of this study was to assess feasibility, risks and patient outcomes of planned laparoscopic two-stage strategy for CRLM through a retrospective analysis of the entire cohort of TSH in a tertiary hepatobiliary laparoscopic center.

Methods: Between 2000 and 2011, 16 of 41 patients referred to our institution for multiple bilobar CRLM were enrolled for a TSH. Median number of CRLM was 6 with median diameter of 40 mm. During first hepatectomy (FH), future liver remnant clearance was achieved by major hepatectomy (MH) and minor hepatectomy/ablative procedure respectively in 1 and 15 patients. Two concomitant portal vein ligations and 7 interval portal vein embolizations were performed. After a median interval of 4 months, 14 (88%) patients were proposed for the second hepatectomy (SH) and 12 (75%) of them completed TSH by a MH (5 right hepatectomy, 3 extended right hepatectomy, 1 extended left hepatectomy and 1 segmentectomy 2, 3, 4b and 7) or by multiple metastasectomy in 2 cases.

Results: FH and SH were achieved by laparoscopy in 81 and 75% of patients, respectively. A concomitant colorectal resection was performed in 43% of cases. One conversion and 3 open resections were necessary during SH. Median of intraoperative blood loss of the SH was 273 ml. During FH and SH, severe complications (grade III/IV Clavien-Dindo classification) were 12 and 25% with no postoperative mortality. Microscopic negative margin resection rate was 75%. Hepatic progression occurred in 2 patients before planned SH, but one of them underwent a delayed second hepatic resection. 3 and 5-year overall survival rate were 55 and 23% respectively. Median overall and disease free survival in patients who completed TSH were 36.4 and 10.9 months respectively.

Conclusion: A planned laparoscopic TSH strategy represents an efficient alternative to the open procedure for multiple bilobar CRLM in an experienced tertiary center. Main advantages of its extended application are to offer the conventional laparoscopic benefits and to facilitate iterative hepatic dissection minimizing surgical impact in case of contraindications for curative resection. In our initial experience, TSH can be performed safely by laparoscopy with limited technical restrictions.

FOS111
EXPRESSION PATTERN OF CXCR4/CXCL12 IS A PROMISING PREDICTIVE MARKER FOR SURVIVAL AFTER HEPATIC RESECTION FOR COLORECTAL LIVER METASTASES

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Introduction: Liver metastases develop in a significant number of patients with colorectal cancer. The chemokine network such as interaction between CXCR4 and CXCL12 plays a role in the induction of organ-specific metastases. The present study examined CXCR4/CXCL12 axis in colorectal liver metastases (CRLM) and determined whether the expression patterns affect tumor microenvironment, and whether they could serve as a marker for survival and a personalized therapy.

Methods: We identified 92 CRLM patients whose tumors were evaluated by CXCR4 and CXCL12 immunohistochemistry. Immunoreactivity for CXCR4 was semi-quantified by assessing staining intensity. CXCL12/CD133 immunoreactivity was semi-quantified by assessing the staining intensity and ratios (%) of positively stained cells. The median follow-up time of these patients was 38 months. Clinicopathological data of these patients were examined. Overall survival rates were evaluated by the Kaplan-Meier method. The univariate

or multivariate analyses were estimated by the Cox proportional hazards models. The expression profile of CXCR4 in the colorectal cancer cell line was determined by fluorescence microscopy.

Results: The cytoplasmic CXCR4 expression was higher in 36 patients than that indicated by CXCR4 staining intensity of hepatocytes. CXCL12 was also expressed in hepatocytes surrounding the tumors at high and low levels in 68 (74%) and 24 (26%), respectively. High levels of nuclear CXCR4 expression were seen in 23 patients which significantly correlated with CXCL12 expression in hepatocytes. The nuclear CXCR4 expression in the cancer cell line increased after exposure to CXCL12. The univariate and multivariate analyses demonstrated that high levels of nuclear CXCR4 and the increased CXCL12 expression in hepatocytes were significantly better prognostic factors for overall and hepatic disease-free survival in patients with CRLM.

Conclusion: The CXCR4 expression in CRLM together with the upregulation of CXCL12 in hepatocytes may help to predict the clinical outcomes of patients with CRLM after hepatic resection. Curative hepatic resection could be performed in patients with high nuclear CXCR4 expression and CXCL12 in hepatocytes. Otherwise, adjuvant chemotherapy may be required for other patients which may establish a personalized therapy.

FOS112
IS RESECTION OF COLORECTAL LIVER METASTASES AFTER CHEMOTHERAPY WITH BEVACIZUMAB AN EFFICIENT STRATEGY?

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Introduction: Resection of colorectal liver metastasis (CLM) can be performed after tumor downstaging by systemic chemotherapy enhanced with bevacizumab because of tumor progression, but long term outcome in this setting is poorly studied. This study assesses postoperative oucome and long-term survival of patients who underwent resection of CLM after a downstaging chemotherapy including bevacizumab by comparison with initially resectable patients treated with first line FOLFOX neoadjuvant chemotherapy.

Methods: Between 2000 and 2010, 347 consecutive patients underwent surgical resection for CLM in our institution and were recorded retrospectively. All 121 patients who underwent CLM resection following neoadjuvant chemotherapy were included. Among them, 26 received bevacizumab associated to chemotherapy in order to control tumor progression under initial chemotherapy regimen (group A) and 95 patients received FOLFOX without tumoral progression for two months before hepatic resection (group C).

Results: Groups A and C did not differ for % of synchronous CLM, postoperative mortality (0% vs 1%) and morbidity rates (8% vs 21%) and use of postoperative chemotherapy. In group A, CLM were more numerous (3 [2–7] vs 2 [1–3], $p < 0.01$), larger (40 ± 37 mm vs 30 ± 22 mm, $p = 0.03$) and more often bilobar (69% vs 29%, $p < 0.01$). 1-year, 3-year and 5-year overall survival (OS) rates were 88%, 41% and 41% in group A and 95%, 60%, 38% in group C ($p = 0.32$). Disease free survival rates were respectively 41%, 24%, and 16% and 48%, 25%, 20% ($p = 0.37$). In group A, absence of extra hepatic disease ($p < 0.01$) and complete pathologic response of at least one CLM ($p < 0.01$) were associated with better OS, the latter being the single significant factor on multivariate analysis.

Conclusion: This study confirms the favourable postoperative outcome of hepatectomies for CLM in patients preoperatively treated with bevacizumab. It validates the resection of CLM which progression under standard chemotherapy is controlled by adjunction of bevacizumab, by reporting for the first time, the good long-term oncological outcome of this strategy. Resectable CLM treated with neoadjuvant FOLFOX and CLM becoming resectable with adjunction of bevacizumab share the same prognosis after resection.

FOS113
A NEW DEVICE FOR DESTRUCTION OF LIVER METASTASES (LM) USING HIGH INTENSITY FOCUSED ULTRASOUND (HIFU): FIRST CLINICAL RESULTS

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Introduction: HIFU has demonstrated efficacy for prostate cancer treatment. It holds great promise in liver tumor treatment due to echographic targeting and no need of puncture. We developed a new powerful toroidal transducer with an integrated ultrasound imaging probe (IUSP) allowing real-time targeting and monitoring. In preclinical studies*, it generated a 7 cm^3 ablation (i.e. 2 cm in diameter) in 40 seconds. This phase I-II study was designed to assess its effectiveness in patients operated on for LM.

Methods: Patients with LM having right hepatectomy were included after informed consent. 2 HIFU ablations (1 superficial, 1 deep) were performed on normal liver to be resected. Phase I was designed to confirm preclinical results and demonstrate effectiveness of HIFU to ablate quickly and safely a large volume of liver. Secondary endpoints concerned real-time monitoring of the lesion with the IUSP. Phase II was designed to assess the ability of the IUSP to precisely guide HIFU ablations. An echogenic marker located within the liver represented a target to be destroyed or to be spared by the HIFU ablation (part 1 or 2 of the phase II). IUSP and pathology measurements were compared after hepatectomy.

Results: 15 patients with LM having right hepatectomy were included from 02/10 to 10/11. For Phase I, 12 40-seconds HIFU ablations were performed in 6 patients. There were no hemodynamic and respiratory changes. No HIFU-related complications occurred. IUSP allowed precise real-time monitoring of all HIFU ablations. IUSP and pathological measurements correlated well ($r = 0.91$). HIFU ablation diameter and depth were 18.7 ± 2.0 and 27.5 ± 6.3 mm (mean $\pm$ SD). For Phase II, 18 40-seconds HIFU ablations were performed in 9 patients. Phase I results were confirmed. The

marker was centered in the HIFU ablation with a precision of 1–2 mm. In the second part of the phase II the HIFU ablation was precisely located at 7 ± 2.3 mm from the marker (expected distance 7.5 mm).

Conclusion: This study confirms our preclinical results*. This new HIFU device achieved fast, safe and accurate large volume liver ablation, without puncture. The accuracy, coupled with real-time guidance and monitoring provided by IUSP, allows juxtaposition of elementary ablations and destruction of large LM with per treatment precise evaluation of margins. Depending on the results of an ongoing phase II, HIFU ablation may become a reference tool to treat LM.

Reference

*Parmentier H et al Ann Surg 2009;249:129–36

FOS114
A PREHABILITATION PROGRAM FOR LIVER SURGERY

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Introduction: Rehabilitation exercise programs improve recovery from surgery and quality of life. Prehabilitation improves fitness prior to surgery. This is challenging before liver resection as patients tend to be sedentary and time is limited. Our aim was to design a 4 week program, suitable for sedentary individuals, which would yield a 1.5 ml/kg/min increase (10%) in the relative VO2 uptake at the anaerobic threshold (AT), as measured by a cardiopulmonary exercise test (CPET).

Methods: Interval based exercise program of 12 sessions on a stationary bike. Each session 40 min long consisting of 6 intervals, warm up and cool down. The interval intensities were calculated using anaerobic threshold detected by initial CPET. AT is independent of volition and can be detected with reliability in most patients. This represents a measure for designing exercise programs for patients. Eleven healthy volunteers completed the exercise program.

Results: The 11 volunteers had a mean age of 46 years (range 38–60). They consisted of 2 men 9 women. Mean BMI 30.7 (range 25.5–39.2), 2 smokers, 9 non-smokers, no significant comorbidities. 96% attendance with 9/11 volunteers achieving 100% attendance. Mean relative VO2 at AT was 12.4 ml/kg/min pre exercise program and 14.0 ml/kg/min post exercise program, a 12% improvement ($p < 0.001$). Mean resting O2 uptake decreased by 28% (p – 0.014). There was a trend to lower resting O2 pulse rate. At AT significant differences were achieved in mean O2 pulse (+11.6), and power (25.7%) $p < 0.001$. Peak values also improved with mean peak O2 pulse climbing by 10.7% (p – 0.001), mean peak power by 14.7% (p – 0.006).

Conclusion: This is the first 4 week exercise program designed for patients prior to liver resection and the only 4 week exercise program based round AT. It is feasible in sedentary healthy volunteers and achieves a >10% fitness improvement. An RCT is underway assessing this program's feasibility in patients prior to liver resection. Using our CPET risk stratification protocol a 10% fitness improvement in these patients would move 30% of our patients from high to low operative risk.

FOS115
PLASMA BILE SALT, TRIGLYCERIDES AND APOA-V LEVELS IN THE PREDICTION OF LIVER VOLUME AND FUNCTION AFTER PORTAL VEIN EMBOLIZATION

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Introduction: Preoperative portal vein embolization (PVE) is a technique to increase the future remnant liver (FRL). The hypertrophy response after PVE has been shown to correlate with outcome after resection. The commonly employed method to assess liver hypertrophy in the non-embolized lobe following PVE is CT volumetry, performed 3–6 weeks after PVE. Early parameters to predict effective hypertrophy are therefore desirable.

Methods: The aim of this study was to assess plasma bile salt levels, triglycerides and apoA-V in the prediction of the hypertrophy response after PVE. Serum bile salt, triglycerides and apoA-V levels were determined in 20 patients with colorectal metastases before PVE, and 5 hours, 1 day, and 21 days after PVE. These parameters were correlated with liver volume as measured by CT volumetry, and liver function determined by Tc-labled mebrofenin hepatobiliary scintigraphy using SPECT.

Results: In patients undergoing PVE, both bile salt and triglyceride levels at 5 hours after PVE positively correlated with the increase in FRL volume ($r = 0.672$, $p = 0.024$; $r = 0.620$, $p = 0.042$ resp.) as well as with liver function after 22 days (for bile salts $r = 0.640$, $p = 0.046$). Serum apoA-V was not altered by PVE but increased shortly after subsequent liver resection.

Conclusion: Bile salt and triglycerides levels at 5 hours after PVE are significant, early predictors of post-PVE liver volume and function increase after 3 weeks. Thus, these parameters can be used in timing of resection after PVE.

FOS116

IS SURGERY JUSTIFIED IN PATIENTS WITH MORE THAN 10 LIVER METASTASES FROM COLORECTAL CANCER?

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Introduction: Liver resection is the sole curative treatment of colorectal liver metastases (CRLM). However patients with more than 3 metastases are known to have less chance of long term survival. With 10 metastases or more, surgery is usually assumed to be merely palliative. The aim of the study was to assess the long term outcome of patients resected for ≥10 metastases.

Methods: From January 1995 to June 2011, within a total cohort of 11 509 patients resected from CRLM and prospectively included in LiverMetSurvey, an international registry, 445 patients (3.9%) had ≥10 CRLM. Both groups with <10 and ≥10 CRLM were compared. Prognostic factors were identified by uni- and multivariate analysis for overall and disease-free survival (OS, DFS).

Results: In the group with ≥10 CRLM, patients were younger ($p < 0.001$) with similar sex ratio but lower proportion of rectal primary (28.8 vs 35.8%, $p = 0.004$) and higher lymph node invasion (74.2 vs 63.2%, $p < 0.0001$). Metastases were more often synchronous ($p < 0.0001$), with higher value of CEA at diagnosis ($p = 0.0005$). Mean number of CRLM was 13.9 vs 2.3 ($p < 0.0001$) with a mean size of 45 vs 38.6 mm, respectively ($p = 0.001$). Metastases were also more bilateral (92.6 vs 33.1%, $p < 0.001$) and initially non resectable (67.8 vs 15.1%, $p < 0.03$) needing a major hepatectomy (70 vs 54.2%, $p < 0.01$), more often combined to an adjuvant technique (Portal embolisation, Radiofrequency, Two-stage) but however less frequently curative (57.7 vs 92.4%). A preoperative chemotherapy was more frequently delivered in pre- as well as in postoperative setting (both $p < 0.001$), and included more often a targeted therapy (Cetuximab or Bevacizumab: 38.4 vs 23.2%, $p < 0.0001$) with a higher response rate to chemotherapy (77.9 vs 64.3%, $p < 0.0001$). OS was 42 vs 62% at 3 yrs and 21 vs 44% at 5 yrs with a DFS of 28 vs 38% at 3 yrs and 13 vs 27% at 5 yrs (all $p < 0.01$). At multivariate analysis, independent predictive.

Conclusion: factors of OS were: age >70 ($p = 0.02$), maximum size >30 mm ($p = 0.03$), incomplete liver resection ($p = 0.04$) and absence of preoperative targeted therapy ($p = 0.004$).

Liver resection for ≥10 CRLM is likely to offer a 21% 5-year survival, although being potentially curative in only 60% of the cases. A good response to preoperative chemotherapy combined to a targeted therapy in a patient <70 years submitted to a complete resection are the best predictors of a prolonged survival.

FOS117

GLASS MICROSPHERE (YTTRIUM-90) RADIOEMBOLIZATION FOR HEPATIC NEUROENDOCRINE METASTASES

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Introduction: Yttrium-90 radioembolization (RE) is a treatment option for management of unresectable hepatic malignancies. Most reports regarding RE for metastatic neuroendocrine tumors (mNET) focus on the use of a resin microsphere delivery system. We sought to examine the toxicity, efficacy, and prognostic factors associated with glass microsphere RE treatment for unresectable mNET.

Methods: A retrospective review of unresectable mNET patients treated with RE was performed. Demographic and clinical data were collected, including Eastern Cooperative Oncology Group (ECOG) status. Tumor response was measured by RECIST criteria and degree of necrosis. Kaplan-Meier curves were used to examine overall survival (OS) from the time of initial RE treatment. Cox proportional hazards models generated hazard ratios (HR) and 95% confidence intervals (CI) to assess independent significance of potential prognostic factors.

Results: Forty-two RE treatments were performed in 27 patients, 20 of which had carcinoid tumors. Indications were symptom control and/or radiographic disease progression. Mean time from diagnosis to RE was 3.8 yrs (range: 1.1–6.2 yrs). Mean number of previous regional therapies was 2.5 and 4 patients had undergone previous liver resection. There were no 30-day mortalities. 6-month surveillance imaging showed no complete responses, 14 partial responses, stable disease in 27, and 1 patient had progressive disease. Median OS was 19.4 months. Higher ECOG status independently predicted poorer survival (HR: 3.3, CI: 1.6–7.4, $p = 0.002$).

Conclusion: To our knowledge, this is the largest reported series of patients treated with glass microsphere RE for mNET. The control of disease progression in advanced disease highlights RE as a useful tool in the treatment algorithm for mNET. Our results demonstrate comparable outcomes to resin microspheres, however larger comparative studies are needed to validate this finding.

FOS118

TEN YEARS OF FOLLOW UP AFTER RESECTION OF COLORECTAL LIVER METASTASES

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Introduction: There are few series of 10 year follow up after resection of colorectal liver metastases (CLRM). Previous studies have suffered from a high proportion of patients lost to follow up, small numbers or combining databases between units. The aim of this study was to review a

cohort of patients with 10 years of actual follow up following resection of CRLM from a single European institution.

Methods: Consecutive patients between 1992 and 2001 were identified from a departmental database. Post operative deaths (n = 18) were excluded. Hospital records, general practitioners, patients and cancer registries were reviewed to minimise loss to follow up and accurately record causes of death.

Results: The 1, 5 and 10 year actual survival was 86, 39 and 23% of 270 subjects respectively. 3 patients cause of death could not be verified and 2 were lost to follow up (2%). Seventy patients underwent 105 further resections for recurrent disease of which 86% were within 5 years of follow up. 5% of those alive at 5 years developed their first episode of recurrence after this point. Advanced age, 6 or more hepatic segments resected, extrahepatic resection, major vascular reconstruction, margin status, node positive primary were associated with worse survival whilst resection of recurrent disease increased median survival.

Conclusion: Providing surveillance beyond 5 years of follow up is advantageous. Nearly one quarter of all patients undergoing resection of CRLM will be alive 10 years following initial liver resection.

FOS119
IMPACT OF PATHOLOGICAL ANALYSIS FROM THE FIRST STAGE HEPATECTOMY ON FEASIBILITY AND RESULTS OF TWO-STAGE HEPATECTOMY

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Introduction: Patients with multiple bilobar colorectal liver metastases (CRLM) can be proposed a two-stage hepatectomy strategy in a curative intent. However, considering its morbidity and mortality and the risk of drop out after the first stage, engaging a patient in this technically demanding strategy must be discussed. We sought to identify if histological factors obtained from the resected specimen at the first stage increased predictability of feasibility and long-term results of the strategy.

Methods: From 2004 to 2010, 50 patients who underwent a first stage hepatectomy for bilobar CRLM were included. The specimen resected at the first stage of 38 of these patients were retrospectively analyzed for number, size, differentiation, vascular, lymphatic and biliary invasion, margins and histological response according to Blazer's score, Rubbia-Brandt's Tumor Response Grade (TRG) and growth pattern of the lesion in a systematic way. Usual perioperative parameters were studied as well. A statistical analysis was conducted in order to identify clinical and histological factors predictive of (i) feasibility of the second stage and (ii) overall and disease-free survival.

Results: The feasibility of the two stages was 76%. The clinical predictive factors of non feasibility of the second stage were male gender (p = 0.003), segment 1 metastasis (p = 0.037) and necessity to resect or radiofrequence more than 3 lesions (p = 0.003). Vascular invasion in the primary (p = 0.02) and microscopic biliary invasion (p = 0.02) better discriminated feasibility of the second stage. A clinicopathological score based on these criteria predicted feasibility of the two stages and disease-free survival in patients achieving the 2 stages. Pathological response evaluated by Blazer's score, TRG or the growth pattern was predictive of overall survival and growth pattern was predictive of recurrence-free survival in patients achieving the two-stages.

Conclusion: Pathological analysis from the resected specimen of the first stage hepatectomy presents an additional value in predicting feasibility of the second stage, overall survival and disease-free survival in patients who achieve the two stages. Combined to clinical parameters it enables better prediction of short and long-term outcomes.

FOS120
PROTECTION OF PHARMACOLOGICAL POST-CONDITIONING IN PATIENTS UNDERGOING LIVER SURGERY. RESULTS OF A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL

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Introduction: Targeted organ protection has gained increasing interest to improve perioperative clinical outcomes. Inflow occlusion is an established procedure to reduce blood loss during liver transection in selective patients, which is, however, potentially harmful due to the associated ischemia-reperfusion injury. Preventive strategies include the use of repetitive short periods of ischemia interrupted by a reperfusion phase (intermittent clamping), and the application of short period of ischemia prior to transection (ischemic preconditioning) or some drugs prior to transection (pharmacological preconditioning). However, whether interventions after resection (post-conditioning) may confer protection is unknown.

Methods: A 3 arm-prospective randomized trial was designed in patients undergoing liver resection with inflow occlusion comparing the effects of pharmacological post-conditioning with the volatile anesthetic sevoflurane (n = 48), intermittent clamping (n = 50) and no protective intervention (continuous inflow occlusion, n = 17) based on proper sample size calculation. Endpoints included serum transaminase levels (AST), postoperative complications and hospital stay. All patients were intravenously anesthetized with propofol. In patients with post-conditioning, propofol infusion was stopped upon reperfusion and replaced by sevoflurane for 10 min.

Results: Compared to the control group, both post-conditioning (p = 0.044) and intermittent clamping (p = 0.015) significantly reduced AST levels. The risk of major

complications was significantly decreased by post-conditioning (odds ratio 0.10 [0.03 to 0.37, p = 0.001]) and intermittent clamping (odds ratio 0.51 [0.27 to 0.96, p = 0.036]) compared to controls. Both interventions reduced length of hospital stay (post-conditioning −4 days [−6 to −1, p = 0.009], and intermittent clamping 2 days, [−4 to 0, p = 0.019]).

Conclusion: This is the first trial demonstrating that pharmacological post-conditioning reduces organ injury and importantly postoperative complications. This easily applicable strategy with clinically relevant benefits should be used selectively in higher risk patients requiring inflow occlusion.

FOS121
CHANGES IN THE PRACTICE OF LIVER RESECTION FOR COLORECTAL LIVER METASTASES OVER A FIFTEEN-YEAR PERIOD IN A HIGH-VOLUME UK HEPATOBILIARY UNIT

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Introduction: Colorectal cancer remains the second most common cause of cancer-related death in Europe and North America. More than 50% of patients develop liver metastases within their lifetime and liver resection remains their only chance of cure. Recent trends in liver surgery have favoured parenchyma-preserving liver surgery over traditional major hepatectomies. The aim of this study was to investigate the trend in approach to liver surgery over a fifteen-year period at a high-volume hepatobiliary unit.

Methods: A prospectively maintained database containing data for the resection of colorectal liver metastases was analysed from 1995 to 2010. Demographic data was extracted together with data on types of liver resection, morbidity and mortality rates, and major versus minor hepatectomies. Minor hepatectomy was defined as any resection up to three segments and major hepatectomy was more than three segments resected. Data displayed compare the three five-year periods from: 1995–1999, 2000–2004 and 2005–2009.

Results: A total of 1414 hepatectomies were undertaken from 1995 up to 2010. 172 resections were performed in 1995–1999, 570 in 2000–2004 and 672 in 2005–2009. Median age and range were as follows: 61 years (36–80 years) in 1995–1999, 65 years (32–87 years) in 2000–2004, and 65 years (23–91 years) in 2005–2009. Major versus minor hepatectomy ratio were as follows: 55 : 45 in 1995–1999, 45 : 55 in 2000–2004, and 33 : 67 in 2005–2009. Complication rates were as follows: 29.1% in 1995–1999, 23.5% in 2000–2004, and 15.9% in 2005–2009. Mortality rates were significantly reduced from 9.3% in 1995–1999, and 3.3% in 2000–2004, to 1.9% in 2005–2009 (P < 0.05).

Conclusion: The trend in liver resection has been towards more segmentectomies and metastasectomies rather than the more traditional major anatomical resections. This has been associated with a decreased complication rate and a significantly reduced mortality rate. This may reflect not only improvements in technique and critical care management but also in the paradigm shift towards parenchyma-preserving liver surgery. Local recurrence and survival rates will dictate whether this is the optimal treatment.

FOS122
FACTORS PREDICTIVE OF SURVIVAL FOLLOWING RESECTION OF EITHER RECTAL OR COLONIC LIVER METASTASES

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Introduction: Whilst colonic and rectal carcinomas are often considered a single disease entity there is a growing body of evidence that this is not the case. Whilst a variety of factors have been shown to predict outcome following resection of metastatic disease from colorectal tumours it is not known if colonic liver metastases (CLM) behave differently to those of rectal origin (RLM). The aim of this study was to identify those factors which predict long-term survival following resection of CLM or RLM.

Methods: We analysed a prospectively maintained Hepatobiliary database of 418 patients (with complete follow up) who underwent liver resection for CRM between January 2000 and December 2010. The cohort was stratified according to the site of the primary tumour with rectal tumours being defined as those within 15 cm of the anal verge.

Continuous variables were compared with the Mann-Whitney U-Test whereas categorical variables were compared with chi-squared test. Survival analysis was performed with Kaplan Meier plots and significance assessed with log rank test. Multivariate analysis was performed using a Cox-Regression model. A p-value of <0.05 was considered significant.

Results: 55% of patients had CLM whereas 45% had RLM (p = 0.258). Patients with CLM were less likely to have node positive primary disease (52% vs 62%; p < 0.05). Overall 5 year survival was similar for both CLM and RLM (42% vs 45%; p = 0.62).

Following resection of CLM multi-variate analysis identified a CEA > 200 (OR 2.39; p < 0.01) and the presence of 4 or more tumours (OR 2.4; p < 0.05) as independent predictors of survival. Whilst there was a strong trend towards poorer 5 year overall survival in those with a resection margin <1 mm this did not reach statistical significance (p = 0.383) on univariate analysis. Following resection of RLM the presence of a resection margin <1 mm was the only independent predictor of survival (OR 2.86; p < 0.001).

Conclusion: Overall 5 year survival following resection of both CLM and RLM is similar. However prognostic factors which predict long-term survival following liver resection differ and this may have implications for selecting those patients for intensive follow-up and perhaps patients who may benefit from other adjuvant treatments.

FOS123

RESULTS FROM THE TREATMENT OF SYNCHRONOUS COLORECTAL LIVER METASTASES AND ANALYSIS OF PROGNOSTIC FACTORS

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Introduction: There is no single opinion on behavior, especially concerning criteria for simultaneous resection of the primary colorectal carcinoma (CRC) and liver metastases (LM), on the long-term survival. The aim of this study is to optimize our approach in the treatment of patients with synchronous colorectal liver metastases based on analyzing prognostic factors.

Methods: This study included 79 curative resection on the occasion of synchronous LM from CRC performed in the period January 2004–December 2010. 43 patients underwent simultaneous resection of primary CRC and LM (S-group) and 36 patients – staged liver resection (LR) (St-group).

Results: The 1-, 3-, 5-year survival rates were 74, 42, 29% in S-group and 74, 29, 13% in St-group, with median survival – 29 vs 23 months, respectively. Univariate analysis for S-group showed favorable impact of: male gender ($p < 0.006$), smaller and atypical LR ($p < 0.001$), but negative impact of: number of LM > 3 ($p < 0.008$), size >5 cm ($p < 0.013$), major LR ($p < 0.001$), bilobar distribution ($p < 0.011$) and blood loss >300 ml ($p < 0.056$). For St-group positive were 2 factors: negative LN ($p < 0.026$) and T2-3 of primary tumor ($p < 0.039$). Multivariate analysis for S-group showed that the volume of LR was the only significant factor on survival ($p < 0.005$). For St-group negative impact had: number of LM > 3 ($p < 0.014$), distribution of LM ($p < 0.003$), metastatic LN ($p < 0.014$).

Conclusion: Determination of an individual therapeutic approach in each patient with synchronous LM from CRC allows achieving the most favorable outcome.

FOS124

CHEMOTHERAPY ASSOCIATED LIVER INJURY AND ITS INFLUENCE ON OUTCOME AFTER RESECTION OF COLORECTAL LIVER METASTASES

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Introduction: Advances in neoadjuvant therapy have provided novel strategies for treating resectable and initially unresectable colorectal cancer liver metastases. While it is known in principle that chemotherapeutic agents cause certain types of liver parenchymal injury, the actual contribution of chemotherapy-associated hepatotoxicity to postoperative morbidity remains poorly defined.

Methods: Between 2002 and 2010, 119 patients with neoadjuvant chemotherapy were included. Eleven histologically defined alterations of nontumoral liver tissue were examined.

Results: The localization of the inflammation had a high influence on morbidity, as patients with a combined portal and parenchymal inflammation had a significantly higher complication rate (81%; $p = 0.005$). Steatosis did not influence the postoperative outcome ($p = 0.5$), whereas steatohepatitis (as assessed by the NAS score) was highly related with morbidity ($p = 0.0001$). In multivariate analysis portal and parenchymal inflammation (CI 1.6–51, OR 9.2; $p = 0.01$) and steatohepatitis (CI 1.8–14.9, OR 5.2; $p = 0.002$) were significantly related with postoperative morbidity.

Conclusion: In this study for the first time, the effect of conventional chemotherapy on inflammation and its relevance for the development of clinical complications could be shown. Steatohepatitis seems to be a matter of particular interest because of its correlation with postoperative morbidity. In contrast, targeted types of therapy neither affect parenchymal structure of the liver nor perioperative outcome after hepatic resection.

FOS125

SURGICAL MANAGEMENT OF LIVER METASTASIS FROM METASTATIC MELANOMA

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Introduction: There is limited evidence in the published literature about the role for surgical resection of hepatic metastasis from melanoma. Our aim was to determine the outcomes for patients who underwent resection of hepatic metastasis, the survival rate and the factors which were predictive of both survival and recurrence.

Methods: Data for all patients who underwent liver resection for melanoma metastasis were collected in a prospective database. These data were supplemented with a review of the patient's charts. Thirty one patients who underwent resection for melanoma were identified between 1980 to 2010. All data were analysed using SPSS version 17. Univariate and multivariate analysis were undertaken to determine the factors which were predictive of survival and recurrence following liver resection for melanoma metastasis.

Results: The median time to development of liver metastasis from initial diagnosis of melanoma was 46 months (range 0–357). Twenty (65%) patients underwent major resection (hemihepatectomy, extended hepatectomy) and 11 (35%) had minor resection (sectionectomy, wedge resection). Twenty-three (74%) of thirty-one patients had histologically complete resection margins (R0) and 7 (23%) had histologically incomplete resection (R1/2). The median survival was 29 months (range 2–139). The actuarial 5-year survival rate was 36%. Improved survival was observed in patients who underwent major resection (major resection, 44 months; minor resection, 12 months; $P = 0.02$) and those with clear histological margins (R0, 35 months; R1/2, 12 months; $P = 0.068$).

Conclusion: Resection of metastatic melanoma of the liver can improve the overall survival. Thus, complete surgical resection of hepatic melanoma metastasis should be considered in selected patients.

FOS126
BEYOND THE LIMIT OF AGE FOR LIVER RESECTION FOR COLORECTAL METASTASES

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Introduction: Older adults with colorectal liver metastases (CLMs) are increasingly undergoing treatments similar to those used in younger individuals, including chemotherapy and surgery. Before considering a surgical approach for CLMs in older adults, it is imperative to analyze risks and costs of such surgery against the potential improvement in life expectancy. The aim of this study was to use a case-control protocol to assess the safety and long-term results of hepatic resection of CLMs in older adults.

Methods: Thirty-two patients with CLMs aged 70 and older (older group) and 32 patients younger than 70 (younger group) were matched in a 1 : 1 ratio according to sex, primary tumor site, liver metastases at diagnosis, number of metastases, maximum tumor size, infiltration of cut margin, type of hepatic resection, and hepatic resection timing.

Results: There was no significant difference in preoperative clinical findings between the two study groups. The incidence of cumulative postoperative complications was similar in the older (28.1%) and younger (34.4%) groups (P = 0.10). One-, 3-, and 5-year disease-free survival rates were 57.6%, 32.9%, and 16.4%, respectively, in the younger group and 67.9%, 29.2%, and 19.5%, respectively, in the older group (P = 0.72). One-, 3-, and 5-year participant survival rates were 84.1%, 51.9%, and 33.3%, respectively, in the older group and 93.6%, 63%, and 28%, respectively, in the younger group (P = 0.50).

Conclusion: Resection of colorectal liver metastases in older adults can be performed with low mortality and morbidity and offers a long-time survival advantage to many of these individuals. Based on the results of this case-control study, older adults should be considered for surgical treatment whenever possible.

FOS127
LAPAROSCOPIC SIMULTANEOUS RESECTION OF COLORECTAL PRIMARY TUMOR AND LIVER METASTASES: PRELIMINARY RESULTS OF A MULTICENTRE INTERNATIONAL STUDY

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Introduction: The arguments for a synchronous resection of colorectal primary tumors and liver metastases by an open technique have been widely discussed in the literature with encouraging results. Laparoscopic liver resection and colorectal surgery have been reported safe, feasible and improved postoperative course. Our aim was to analyze the feasibility, the immediate and long-term outcomes and the advantages of laparoscopy for simultaneous resection of colorectal primary tumour and liver metastases.

Methods: A retrospective review of 12 International centres on laparoscopic simultaneous resection of colorectal primary tumor and liver metastases was undertaken. All types of colorectal resection as well as all types of liver resection were included in the study.

Results: One hundred and twelve patients were analysed. Laparoscopy enabled liver and colonic resection with the addition of one or two extra trocars. The feasibility, conversion rate, the use of hand assistance and postoperative results are reported. The advantages of this laparoscopic combined technique are discussed.

Conclusion: Laparoscopic colorectal resection with simultaneous resection of liver metastases is technically feasible and safe with some short-term advantages.

FOS128
REPEAT LIVER RESECTION FOLLOWING HEPATIC TRISECTIONECTOMY AND EXTENDED TRISECTIONECTOMY FOR COLORECTAL LIVER METASTASIS

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Introduction: Right and left hepatic trisectionectomy and extended trisectionectomy are the largest liver resections performed for malignancy. We report a series of 23 patients

who had at least one repeat resection following hepatic trisectionectomy for colorectal liver metastasis (CRLM).

Methods: A retrospective analysis of a single center prospective liver resection database from May 1996 to April 2009 was used for patient identification. Full notes, radiology and patient reviews were analysed for a variety of factors with respect to survival.

Results: Twenty three patients underwent up to 3 repeat hepatic resections following 20 right and 3 left hepatic trisectionectomies. In 18 cases the initial surgery was an extended trisectionectomy. Overall 1-, 3- and 5-year survival rates after repeat resection 100%, 46%, and 32%. No factors predictive for survival were identified.

Conclusion: Repeat resection following hepatic trisectionectomy for CRLM can offer extended survival and should be considered where appropriate.

FOS129
SIMULTANEOUS COLORECTAL AND HEPATIC PROCEDURES FOR COLORECTAL CANCER: INCREASED MORBIDITY BUT EQUIVALENT MORTALITY TO COLORECTAL OR HEPATIC PROCEDURES ALONE – OUTCOMES FROM THE NATIONAL SURGICAL QUALITY IMPROVEMENT PROJECT (NSQIP)

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Introduction: Simultaneous colorectal and hepatic procedures for colorectal cancer (CRC) are increasingly being performed as CRC surgery becomes safer, less invasive, and better tolerated. NSQIP provides validated, risk-adjusted 30-day perioperative outcome data from over 250 hospitals nationwide, allowing large-scale examination of these procedures.

Methods: Data from NSQIP 2005–2008 were used to compare 22534 patients (19925 colorectal procedures for primary malignancy [CR]; 2295 hepatic procedures for secondary malignancy [H]; 314 simultaneous procedures [SIM]).

Results: Patients undergoing SIM procedures had higher rates of the following co-morbid conditions compared to CR patients: Dyspnea, Coronary Intervention/Surgery, Hypertension, Peripheral Vascular Disease, Disseminated Cancer, Weight Loss, Chemotherapy, and Radiation ($p < 0.05$). Fewer complex colorectal and hepatic procedures were performed in the SIM group (LAR/Total Colectomy 21.5% vs 26% ($p = 0.014$), Hemihepatectomy or greater 19.1% vs 33.5% ($p < 0.001$)). Operative time (min) varied across groups: CR 148, H 216, SIM 265 ($p < 0.001$), as did post-operative stay (days): CR 6, H 5, SIM 7 ($p < 0.001$). Compared to CR and H procedures alone, SIM surgery resulted in a higher rate of the following complications: wound infection ($p < 0.001$), organ space infection ($p < 0.001$), and septic shock ($p = 0.014$). 30-day mortality did not differ among the groups (CR 2.4%, H 1.2%, SIM 1.6%, $p = 0.35$).

Conclusion: Patients undergoing simultaneous colorectal and hepatic procedures have a higher comorbidity profile, and these procedures are associated with an increased operative time, length of stay, and rate of perioperative complications. Simultaneous procedures do not, however, increase perioperative mortality.

FOS130
LAPAROSCOPIC MAJOR LIVER RESECTIONS: 50 FIRST CASES

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Introduction: The place of laparoscopic major liver resections for liver tumors remains debated. The aim of the present study was to evaluate the feasibility and safety of laparoscopic major liver resection in a large series from a single center.

Methods: From 2000 to August 2011, 578 patients underwent major liver resection (≥3 segments according to Couniaud). Among them, 50 (8.7%) were performed under laparoscopy and represent the present study population. The laparoscopic approach was considered for tumors without contact with the main vascular structures.

Tumors were benign in 20 (40%) cases. Malignant tumors (30 cases, 60%) included colorectal metastases (n = 12), HCC on chronic liver disease (n = 9), and breast cancer metastases (n = 5). Tumor size was <15 cm. Five-port CO2 laparoscopy was used and the specimen was extracted in a bag through a separate lower abdominal incision.

Results: Resections were: 35 right hepatectomies and 15 left hepatectomies. According to the Louisville's international position statement in 2008, 38 procedures were purely laparoscopic and 12 were hand-assisted. The mean operative time was 300 ± 90 min. 28 (56%) procedures were performed without clamping and 22 (44%) under intermittent clamping with a mean duration of 38 ± 13 min. Mean blood loos was 500 ± 480 ml. Conversions to laparotomy occurred in 10 cases (20%) for hemorrhage in 6 cases (one major > 1500 ml) and insufficient exposure 4. Four cancer patients (13.3%) had R1 resection on the specimen. Operative mortality was nil. According to Clavien's classification, complications were grade 0, I, II, III, IV in 38, 1, 5, 5 and 1 cases respectively (morbidity rate = 24%). Duration of ICU stay and hospitalization were 2.8 ± 2.5 and 9.3 ± 3.8 days respectively.

Conclusion: Our study shows that major LLR in selected patients is a safe procedure. Surgical margin for malignant tumors needs to be improved.

FOS131

SAFETY AND EARLY EFFICACY OF IRREVERSIBLE ELECTROPORATION FOR HEPATIC TUMORS IN PROXIMITY TO VITAL STRUCTURES

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Introduction: Thermal ablation of hepatic tumors is an accepted treatment modality when resection is not feasible. Current thermal ablation technologies such as RFA, Microwave, and Cryo are often limited by tumor location, particularly proximity to major vascular and biliary structures. This study was undertaken to evaluate the safety and early efficacy of irreversible electroporation (IRE) for hepatic tumors.

Methods: An IRB approved prospective, multi-institutional, treatment registry of 150 patients undergoing 175 treatments for primary or secondary cancers in the liver was evaluated from 8/2009 to 10/2011. Outcomes were compared and stratified by treatment approach and tumor histology. Ablation success was defined as lack of recurrence at the ablation site, and was determined by Kaplan-Meier.

Results: There were 60 patients undergoing 71 IRE procedures, with 52 (88%) pts lesions in proximity to major vasculature, bile duct, or other organ. IRE was performed via an open (19.6%), lapaparoscopic (3.9%), or percutaneous (76.5%) approach. The median number of tumors treated per procedure was 1, with a maximum of three. The most common diagnosis was colorectal metastasis (43.1%), followed by HCC (33.3%). There were 9 adverse events. Overall, successful ablation was maintained in 35.2% at 12 months. This rate was lowest in the percutaneous group (25.7%), and highest in the open treatment group (62.5%; $p = 0.765$).

Conclusion: IRE is safe for palliation of nonresectable hepatic tumors, although it may be limited by early recurrence, particularly for metastatic CRC and when performed percutaneously. Further prospective study is needed to determine its ideal role in the therapeutic armamentarium.

FREE ORALS: HCC

FOS132
MULTICENTRE STUDY OF LIVER CELL ADENOMAS

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Introduction: Liver cell adenoma (LCA) is a benign tumour that could present several complications. Classical surgical strategy was to resect every LCA diagnosed. Some recent papers have demonstrated that LCA smaller than 3 cm and without expression of ßcathenin should not be resected because they usually did not complicate. So, non-surgical therapy and close follow up has been postulated for some LCA. HPB Section of the Spanish College of Surgeons has performed a retrospective multicentre study of resected LCA as first step of a prospective study of every LCA evaluated in Spanish HPB Units.

Methods: Retrospective multicentre study made by 14 HPB Units. Inclusion criteria: LCA patients operated on with mandatory histological confirmation. Study period: 1995–2011. Data collection was made by a database including epidemiological, clinical, surgical and follow up parameters.

Results: We have operated on 81 patients with proven LCA. Median age: 39.5 years (range: 14–75). Sex: 61 women (75%). Body mass index: 27 kg/m^2 (range: 21–41) Previous estrogen intake: 26%. LCA median size was 8.8 cm (range: 1–20 cm). Only 6 LCA were smaller than 3 cm (7.4%) Median number of LCA was 1 (range: 1–12). Nine patients had adenomatosis. 51% of the patients (41) were symptomatic. Most frequent symptom was abdominal pain. Haemorrhage or rupture occurs in 9 patients. Preoperative diagnosis was correct in 60% of the cases. Only one preoperative embolization was done. 90% of surgical procedures were planned (73/81). The procedures were: major hepatectomies (18) (22%), minor (62) (77%) and liver transplantation (1). 20% were made by laparoscopic approach. Morbidity rate was 28% (23/81) (Clavien I-II: 19 (82%); Clavien: III-IV: 4 (18%)). Mortality was nil. Two patients had malignant transformation and one case showed severe dysplasia. Median follow up was 43 months (range: 1–192). 2 relapses were diagnosed in follow up. Comparing ruptured and/or bleeding cases with non-complicated cases: patients with complicated cases present bigger LCA, more frequently adenomatosis and a higher morbidity ($p < 0.05$).

Conclusion: In our retrospective study, patients are usually women (75%), with huge lesions (8.8 cm), a low estrogen intake (30%), only symptomatic in 50% of the cases and 10% of the cases are complicated (bleeding/rupture).

– Major hepatectomy was performed in 22% of the patients. 20% of the procedures were performed laparoscopically. Morbidity was low and no mortality was observed.
– Complicated cases occur in bigger LCA and in patients with adenomatosis. Postoperative morbidity is much higher in these cases comparing with non-complicated cases.

FOS133
HEPATIC RESECTION FOR HEPATOCELLULAR CARCINOMA USING A RADIOFREQUENCY ABLATION DEVICE

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Introduction: The hepatocarcinoma (HCC) is the most frequent primary liver malignant tumor. The surgical resection remains the gold standard for this malignancy. In the last decades different techniques have been developed to allow safer liver resection; radiofrequency assisted liver resection is one pf these methods. The aim of this study is to evaluate this procedure.

Methods: We enrolled into the study 35 consecutive patients with resectable HCC. The patients were assigned in two groups: 45.7% (N = 16) in group A – operated using a radiofrequency ablation device (RFAD) and respectively, 54.3% (N = 19) in group B – liver resection performed classicaly without RFAD. The men/women ratio was 25/10 and the mean age 62.57 ± 1.96 years old (range: 26–88). We found no difference between the two groups from point of view of demographic data. All the data were encoded and introduced into a MS Access database and statistically analyzed using SPSS software.

Results: Cirrhosis and esophageal varices were more frequent in group A ($p = 0.013$ and respectively 0.021). In most cases the tumor was unique 77.1%; however 14.3% patients have 2 tumors, 5.7% 3 tumors, and in one case (2.9%), 4 tumors have been encountered. The mean overall tumor volume was 161.79 ± 35.5 mL, with no difference between the two groups ($p = 0.938$). The postoperative time was lower in group A (132.5 ± 15.37 vs 167.89 ± 10.61 min) but without statistical significance ($p = 0.061$). The blood loss was also reduced in group A (459.37 ± 85.41 vs 716.31 ± 148.69 mL). Even no difference between the two groups has been noted for operative accidents ($p = 0.508$), postoperative morbidity ($p = 0.782$). The overall postoperative mortality was 2.2% (N = 1, in group B).

Conclusion: The use of RFAD allows performing liver resection with low rates of postoperative mortality and morbidity and decreasing operating time and blood loss. For the central segments the technique is less used for to anatomical reasons.

FOS134

SINGLE CENTER EXPERIENCE OF LAPAROSCOPIC HEPATECTOMY: THE COMPARISON OF PERIOPERATIVE OUTCOMES BETWEEN EARLY AND LATE PERIOD

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Introduction: The aim of this study is clarifying the safety and feasibility of laparoscopic hepatectomy through comparing early and late period perioperative outcomes.
Methods: We retrospectively analyzed medical records of 138 patients who underwent laparoscopic liver resections from January 2003 to June 2011 at Yeungnam University Hospital. We divided the patients to early period (from January 2003 to February 2007) and late period (March 2007 to June 2011) and compared perioperative outcomes including mean operation time, intraoperative blood loss, postoperative hospital stay, ICU stay hour, and duration of LFT normalization.
Results: The mean operation time was 308 minutes (range 140–510 minutes) in early period group and 193 minutes (range 40–350 minutes) in late period group ($p < 0.001$). The mean intraoperative blood loss was 171 ml (range 50–1200 ml) in early and 44 ml (range 0–400 ml) in late ($p = 0.005$). The postoperative hospital stay was 9.7 days (range 4–31 days) in early and 6.8 days (range 2–9 days) in late period ($p < 0.001$). The ICU stay was 21.6 hour (range 0–120 hour) in early and 2.8 hour (range 0–24 hour) in late period ($p < 0.001$). The duration of LFT normalization was 5.7 days (range 0–39 days) in early and 2.1 days (range 0–20 days) in late period ($p = 0.003$). The perioperative outcomes were significantly better in late period than in early period.
Conclusion: Laparoscopic liver surgery is feasible and can be safely performed in selected patients but requires a long experience in open liver resection and mastery of laparoscopic surgical skills.

FOS135

ADJUVANT LIPIODOL I-131 AFTER RESECTION OR RADIOFREQUENCY ABLATION FOR HEPATOCELLULAR CARCINOMA

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Introduction: After resection or destruction by radiofrequency ablation (RF) of hepatocellular carcinoma (HCC), recurrences are frequent. Following the randomized controlled trial in Hong Kong by Lau et al. in 1999, patients have been offered adjuvant lipiodol I-131. The aim of this study was to determine the effectiveness of adjuvant lipiodol I-131, following potentially curative surgery for HCC on overall and disease-free survival rates through the experience of a single-center hepatobiliary center.
Methods: Cohort comparison study of patients surgically treated for HCC. 38 patients were treated with adjuvant postoperative intra-arterial injection of 131I-lipiodol and compared to 42 patients who did not receive the treatment. Surgery was considered curative on the pathological examination of the specimen (surgical resection) and imaging control 1 month after surgery. Risk factors for liver disease, tumour criteria and the criteria of quality of treatment were analyzed. Each patient was reviewed every three months with a morphological (CT scan) and biological (alpha-fetoprotein) assessment. Disease-free survival and overall survival were analyzed and compared between the two cohorts.
Results: The 2 groups were similar. During a median follow up of 24 months, 21 recurrences were observed in the treated group vs 32 in the control group. The recurrence was hepatic and unique in 62% of cases in the treated group, while the recurrence was multiple (hepatic or extra hepatic) in 50% of cases in the control group. The 2 years recurrence-free survival was 43.8% in the treated group vs 29% in the control group ($p = 0.0139$). The median recurrence-free survival rates were 23 vs 11 months, respectively.

The overall survival at 2 and 3 years, with or without treatment was 100 and 72%, 70 and 59%; respectively. Median overall survival was not significantly different between 2 groups (45 months vs 40.2 months).
Conclusion: This study suggests that adjuvant iodine-131-lipiodol improves disease-free survival in patients with HCC after hepatic resection or RFA. Overall survival was not significantly improved by this treatment in our study, although a trend in favour of adjuvant therapy can be observed.

FOS136

THE FEASIBILITY AND THERAPIUTIC EFFECT OF PURE LAPAROSCOPIC HEPATECTOMY

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Introduction: Liver resection has dramatically evolved over the years. Laparoscopic hepatectomy is especially a recognized alternative to open surgery. However, in pure laparoscopic hepatectomy (PLT), the safety and the efficacy of the techniques are still unknown. This study explored the feasibility and therapeutic effect of PLT.
Methods: Between April 2002 and November 2011, patients suitable for liver resection were carefully assessed. Data were collected prospectively to assess the outcome including, size of tumor, intra-operative blood loss, operation time, duration of hospitalization, diseased free survival rate, and overall survival rate.
Results: The lateral segmentectomy and partial resection was performed under Pure laparoscopic Surgery. The left or right lobe was mobilized by laparoscopically, followed by applying a small incision, and the left or right Glissonian pedicle was handled integrally by the Endo-linear stapler. Liver resection was carried out with the SonoSurge (brade

type) or CUSA using a hanging maneuver. Twenty-three of fifty-six patients underwent PLH. The mean size of tumor was 25.1 ± 11.6 mm, mean operation time and blood loss was 348.1 ± 130.4 min and 339.2 ± 496.7 g. The mean duration of hospitalization was 12.6 ± 5.84 days. One, three, five year disease free survival rate: 97.8%, 31.4%, 23.6%. Three, five years survival rate: 94.0%, 81.0%.

Conclusion: Pure laparoscopic hepatectomy can be done safely and effectively with applying some devices for appropriately selected patients.

FOS137
USEFULNESS OF EVALUATING SEGMENTAL FUNCTIONAL RESERVE OF THE LIVER USING EOB-MRI AND INDOCYANIN GREEN FLUORESCENCE NAVIGATION DURING OPERATION FOR SAFE AND CURATIVE HEPATECTOMY

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Introduction: Gadolinium-ethoxybenzyl-diethylenetriamine pentaacetic acid (Gd-EOB-DTPA), EOB-MRI, can be useful as a novel imaging technique for the estimation of regional liver functional reserve. Hypereye medical system (Mizuho, Japan) is also a novel imaging system by using indocyanine green fluorescence. In this study, we confirmed the usefulness of pre-operative estimation with EOB-MRI and intraoperative navigation with Hypereye medical system.

Methods: 1. EOB signal intensity (SI) and estimation of regional liver functional reserve: Non-dilated (58 cases) and segmental-dilated (6 cases) intrahepatic duct type were examined. We evaluated the correlation between SI and liver function.

2. Intraoperative navigation using Hypereye: 19 cases (34 nodules) of hepatectomy were examined. Indocyanine green (ICG, 0.5 mg/kg) were injected via peripheral vein 4–7 days before operation. During operation, we confirmed known tumors and search unknown tumors. Under the US, we confirmed the optimal liver resection area by portal vein injection (direct method) or vein injection after the interruption of the dominant Glisson's (indirect method). Moreover, we checked the bile leakage by bile duct injection.

Results: 1. Standardized SI had strong correlation with LHL (r = 0.64) and ICG15 (r = 0.72) and there was not deviation in the cases of hyperbilirubinemia and liver damage C. SI in segmental dilated intrahepatic duct (2.4 ± 0.4, ICG: 17.0%) was lower than that of non-dilated intrahepatic duct (3.1 ± 1.0, ICG: 1.6%), and we could estimate the remnant liver volume and function using volumetry.

2. 31 nodules (91%) were detected from liver surface and we found 2 new nodules. Both direct and indirect method had the significant demarcation line. Using the stained area as intersegmental plane during operation, we could navigate the accurate anatomical hepatectomy. We had 3 cases of bile leakage, however we prevented the post-operative bile leakage by repairing.

Conclusion: We could perform the safe and curative hepatectomy by preoperative estimation with EOB-MRI and intraoperative navigation using indocyanine green fluorescence navigation.

FOS138
NOVEL THREE-DIMENSIONAL VIRTUAL LIVER SURGERY SYSTEM IS USEFUL FOR SIMULATION OF ANATOMICAL HEPATECTOMY

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Introduction: The relevance of novel 3-dimensional (3-D) virtual liver surgery system in patients with liver tumors who underwent anatomical hepatectomy has not been evaluated in detail.

Methods: Between 2010 and 2011, 80 patients with liver tumors underwent virtual anatomical hepatectomy using a 3-D virtual liver surgery system. Predicted liver volume was compared with the actual liver volume among patients who underwent anatomical sectionectomy, segmentectomy, and hemihepatectomy.

Results: The mean predicted liver volume and actual liver volume were 323 ± 176 ml and 303 ± 170 ml in 41 sectionectomy, 146 ± 78 ml and 162 ± 93 ml in 11 patients who underwent segmentectomy, and 592 ± 279 ml and 546 ± 244 ml in 26 hemihepatectomy. The average error between predicted liver volume and actual liver volume was 28 ± 22 ml in sectionectomy, 26 ± 17 ml in segmentectomy, and 56 ± 67 ml in hemihepatectomy, respectively. The predicted liver resection volume showed a significant correlation with the actual liver volume in patients who underwent sectionectomy ($r = 0.985$, $n = 41$, $p < 0.0001$), segmentectomy ($r = 0.955$, $n = 11$, $p < 0.0001$), and hemihepatectomy ($r = 0.968$, $n = 26$, $p < 0.0001$).

Conclusion: A novel 3-D virtual liver surgery system is a useful tool for simulation of anatomical hepatectomy.

FOS139
INFLUENCE OF THE NON-TUMOUROUS PARENCHYMA IN THE SAFETY OF LIVER RESECTION FOR METABOLIC SYNDROME ASSOCIATED HCC

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Introduction: Hepatocellular carcinoma arising in patients with insulin resistance/metabolic syndrome (MS-HCC) is frequently associated to non-alcoholic fatty liver disease (NAFLD). Despite increasing incidence, results regarding liver resection in this setting remain poorly described.

Methods: From 2000 to 2011, 62 patients (68.4 ± 7.8 years) underwent curative resection for MS-HCC, representing over 15% of all HCC resections during the latest years. Patients were classified according to the degree of underlying parenchymal damage: (a) normal liver in patients with NAFLD

activity score (NAS) <2 without fibrosis/cirrhosis; (b) diseased parenchyma in patients presenting with a NAS of 2 or more and/or associated cirrhosis. This latter group was divided according to the fibrosis grade into fatty non-cirrhotic livers and cirrhotic livers. Patient's characteristics and outcomes were compared according to pathological features of the underlying parenchyma, and predictive factors of morbidity were analyzed.

Results: Tumor size was 7.5 cm (2–25) and 32 (52%) patients underwent major resection. Non-tumorous parenchyma was normal in 24 patients (39%) and diseased in 38 (61%) including 18 (29%) with cirrhosis. Preoperative biopsy performed in 26 (42%) patients identified a diseased parenchyma with 86% sensitivity. Mortality, overall and major complications were significantly increased in patients with diseased parenchyma even without cirrhosis. Major postoperative complications were also associated to portal trial clamping, increased blood loss, age of more than 70 years and major right-sided resection. One, 3 and 5 years-overall and disease-free survival rates of 83%, 75%, 75% and 83%, 70%, 56% respectively were not influenced by the underlying parenchyma.

Conclusion: MS-HCC is increasingly observed. Increased operative risk following liver resection in these old patients with large tumors in case of diseased underlying parenchyma even without cirrhosis emphasizes the role of preoperative biopsy in the non-tumourous parenchyma. Favourable long-term outcome justifies perioperative refinements to improve postoperative tolerance.

FOS140
SAFETY OF LIVER RESECTION AFTER SORAFENIB ADMINISTRATION

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Introduction: There is currently no knowledge about feasibility and safety of liver surgery after sorafenib which could be used as a neoadjuvant treatment in HCC patients.

Methods: Twenty-three HCC patients who underwent liver surgery after mean duration treatment of 1 month (0.2–11) with sorafenib were compared with 46 patients matched for age, underlying hepatopathy and type of resection. Endpoints were intra operative data (operative time, transfusions), postoperative morbidity and liver function.

Results: A major hepatectomy was performed in 44% in sorafenib group and 57% in control group (p = ns). Pediclar clamping was required in 70% and 74% respectively (p = ns). Operative times were similar (280 m (120–330) vs 240 m (80–460)). Overall morbidity was 44% and 59% (p = ns) with ascites in 22% and 35%, haemorrhage in 0 and 4%, liver insufficiency in 0 and 9% (p = ns). Prothrombin time and bilirubinemia levels at postoperative days 1 and 3 were not different, showing no impairment in recovery of liver function in sorafenib group. In-hospital stay was 9 d (5–19) in sorafenib group and 11 d (5–54) in control group.

Conclusion: This unique study assessing the impact of sorafenib before liver surgery showed that no complication related to this treatment were observed.

FOS141
IMPACT OF CHEMOEMBOLIZATION WITH DOXORUBICIN LOADED BEADS (DC BEADS) IN PATIENTS AWAITING LIVER TRANSPLANTATION FOR HEPOCELLULAR CARCINOMA

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Introduction: Transarterial chemoembolization is frequently used during the waiting time of liver transplantation for hepatocellular carcinoma. Theoretical goals: slow the tumor progression, decrease the drop-out rate and decrease tumor recurrence after liver transplantation.

The aim of this study was to evaluate the benefit of chemoembolization with doxorubicin loaded beads (DC beads) in patients awaiting liver transplantation for hepatocellular carcinoma (HCC).

Methods: Between December 2006 and March 2010, 15 patients evaluated for liver transplantation for HCC were treated by hyperselective chemoembolization DC beads during the waiting period. The evaluation of the effectiveness of treatment was performed according to modified RECIST criteria by EASL, by a liver MRI at 1 month of each course. In case of complete response, monitoring of recurrence was done by quarterly MRI. A new cure was achieved in the absence of complete response or in case of recurrence. Treatment efficacy was also assessed by analysis of the liver explant (tumor necrosis, number of HCC ...). Data are expressed as mean ± SD and median (range).

Results: The mean age of patients was 54 years (2 woman and 13 men). The median number of HCC at the initial assessment was 2 (1–7), with an average diameter of the largest tumor of 31 ± 10 mm, and a sum of diameters of 56 ± 38 mm. The Milan criteria were met in 11/15 cases. After the 1st treatment, 4 patients could not have radiological assessment because they had been transplanted. Of the 11 remaining patients, complete response was observed in 3 cases, partial response in 5 cases, stable disease in 1 cases and 1 tumor progression in 2 cases.

Twelve patients were transplanted after a median of 1 course of DC beads (1–3). In the explant liver, necrosis >95% was observed in 4 cases (33%), necrosis between 50 and 85% in 3 cases (25%) and necrosis <50% in 5 cases.

Conclusion: In this series, chemoembolization with doxorubicin loaded beads (DC beads) has an objective response in 8 out of 15 cases after the first course. A complete tumor

necrosis was observed in 4 cases out of 12. This technique could be proposed for tumor control on waiting list. These results must be compared to those of hyperselective conventional chemoembolization.

FOS142
SURVIVAL ANALYSIS OF HIGH INTENSITY FOCUSED ULTRASOUND THERAPY VERSUS RADIOFREQUENCY ABLATION IN THE TREATMENT OF RECURRENT HEPATOCELLULAR CARCINOMA

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Introduction: High intensity focused ultrasound (HIFU) is a non-invasive local ablative therapy that utilizes thermal energy produced by an ultrasonic beam targeting at a focal point to induce tissue necrosis. Recent studies showed its efficacy in the treatment of hepatocellular carcinoma (HCC). This study aims to evaluate our experience of HIFU in comparison with that of radiofrequency ablation (RFA) for the treatment of recurrent HCC.

Methods: From October 2006 to October 2009, 27 patients received HIFU therapy for recurrent HCC in our center. Their postoperative and survival outcomes were analyzed and compared with 76 patients who received RFA within the same period. Survival outcomes between the two groups were compared using the log-rank test and P value <0.05 was considered to be significant.

Results: The median duration of follow up was 27.9 months. The median tumor size in HIFU and RFA group was 1.8 and 1.7 cm respectively (P = 0.28). Operative morbidity rate in the HIFU and RFA group was 7.4% and 22.4% respectively (P = 0.06). Skin burn and liver abscess were the two complications associated with HIFU therapy. There was no hospital mortality in the HIFU group while two deaths occurred in the RFA group. The 1-, 2- and 3-year disease-free survival rates for HIFU group were 37.0%, 25.9% and 18.5%, and for RFA group were 48.6%, 32.1% and 26.5% respectively (P = 0.61). The 1-, 2- and 3-year overall survival rates for the HIFU group were 96.3%, 81.5% and 69.8%, and for RFA group were 92.1%, 76.1% and 64.2% respectively (P = 0.19).

Conclusion: Our preliminary experience in utilizing HIFU therapy for treatment of recurrent HCC is promising. It appears to attain similar survival outcomes with that of RFA. Further studies are needed to explore its role as a primary treatment for HCC.

FOS143
EXPRESSION OF GLYPICAN-3 IN EARLY HEPATOCELLULAR CARCINOMA

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Introduction: Glypican-3 is a specific biomarker for advanced hepatocellular carcinoma (HCC). However, the role of glypican-3 expression in early HCC has not been clarified yet. Therefore, our aim is to evaluate the role of glypican-3 in early HCC.

Methods: Between 1995 and 2010, 49 patients with early HCCs had undergone hepatectomies were selected for the study and 49 nodules of early HCCs were diagnosed pathologically. Early HCC was defined as small well-differentiated HCC of vaguely nodular type according to the Japanese Liver cancer classification. The expression of glypican-3 (GPC3) was investigated in relation to the clinicopathological features of patients with early HCC by immunohstochemistry staining.

Results: A total of 22 cases were immunohistochemistry stained glypican-3 (GPC3) positive. Female patients in our study received higher GPC3 expression than male patients (P = 0.042). Patients in HCV positive (P = 0.044) received overexpression of GPC3. Patients with multicentric tumor expressed higher GPC3 than those with solitary tumor. Furthermore, patients with GPC3 positive expression received shorter disease-free survival (DFS) than those with negative cases (37.4 ± 7.4 months and 62.1 ± 9.0 months, respectively) (P = 0.037). Additionally, overall survival (OS) in patients with GPC3 positive was shorter than patients with negative expression (65.5 ± 7.6 months and 90.4 ± 10.0 months, respectively) (P = 0.013).

Conclusion: The expression of Glypican-3 participates in the early hepatocaracinogenesis and accompany with poor outcome in patients with early stage of hepatocellular carcinoma.

FOS144
RESULTS OF HEPATIC RESECTION IN TRANSPLANTABLE HEPATOCELLULAR CARCINOMA (HCC)

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Introduction: The place of resection in transplantable HCC is still debated. The aim of this study was to compare the outcomes of liver resection (LR) with liver transplantation (LT) for HCC in Child A cirrhotic patients inside Milan criteria.

Methods: This was a monocentric retrospective study included 97 patients from 1989 to 2009. The data cutoff point was April 2010. The resection group was matched to transplant group according these matching criteria: child A cirrhosis and HCC inside Milan criteria.

Results: Fifty-two patients underwent transplantation (LT group) and 45 resection (LR group). The mean number of HCC was 1.09 for the LR group and 1.5 for the LT group. The LR and LT morbidity rates were respectively 34.8% and 26.9%. The overall survival rates (LR vs LT) were respectively at 1, 3 and 5 years: 90.7 vs 88.2%, 79.5 vs 75.2% and 65.9 vs 72.1% ($p = 0.949$). Recurrence rates were 40% for LR and 4% for LT ($p < 0.001$). Five-year disease free survival rates was respectively for LR and LT: 47.7 vs 72.4% ($p = 0.057$). Recurrence in LR group was within Milan criteria for 12 patients (67%), but only 2 of these patients were transplanted.

Conclusion: In our hand, for Child A cirrhotic patients inside Milan criteria, LR survival rate was not significantly different from LT even if there was more recurrence. These results suggest that surgical resection still has an important place for patients that could also be eligible to transplantation, especially because we always face a shortage of donors.

FOS145
LIVER RESECTION FOR HEPATOCELLULAR CARCINOMA: A WESTERN SERIES OF 313 PATIENTS

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Introduction: Hepatocellular carcinoma (HCC) is the most common primary liver cancer. Resection and liver transplantation remain the gold standard therapies. Liver resection (LR) for HCC has been regaining interest because of a shortage of organs for transplantation and because LR is the only option for large tumors. The aim of this study was to determine the independent effect of tumor size on recurrence and survival.

Methods: 313 patients with a median age of 60 (16–86) underwent LR for HCC from 3/89–9/10. 251 patients (80%) had underlying liver disease (Hepatitis C = 76, Hepatitis B = 77, Alcohol = 61, Other = 37). Data were analyzed according to tumor size, <50 mm (G1: 111), 50–100 mm (G2: 113) and >100 mm (G3: 89) and for two periods, 1989–1999 (n = 91) and 2000–2010 (n = 222). 87% of resections were anatomical. Major resections were performed in 56% of cases (G1 27%, G2 57%, G3 90%). A laparoscopic approach was used in 23% of cases, mostly in G1. Kaplan-Meir survival estimates, and univariate and multivariate cox-regression analyses were performed.

Results: Mortality and morbidity rates were 8% and 29%, respectively. 5-year overall survival was 50%, 67% (G1), 46% (G2), 34% (G3). 5-year disease-free survival was 28%, 32% (G1), 27% (G2), 26% (G3). 5-year disease free survival was significantly better in patients without underlying liver disease. On multivariate analysis, poor tumor differentiation (HR 1.9), vascular invasion (HR 2.1), blood transfusions (HR 1.9), and portal hypertension (HR 2.1) were significant predictors of recurrence. Poor tumor differentiation (HR 4.7), AFP > 200 (HR 1.5), vascular invasion (HR 1.8), blood transfusions (HR 2.6), and portal hypertension (HR 2.0) had a negative impact on survival, while salvage transplantation (HR 0.31) had a positive impact.

Conclusion: LR is an efficient treatment of HCC for every disease stage and its safety has improved in recent years. R0 resection was achieved in 88%. Tumor size alone did not significantly impact survival or recurrence. Tumor biology impacts recurrence and survival. Although hampered by high recurrence rates, resection offers good overall survival and may allow better selection of candidates for transplantation in an era of organ shortage. 35 patients underwent secondary LT.

FOS146
SURGICAL STRATEGY FOR HCC-PATIENTS WITH CHILD-PUGH CLASS B

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Introduction: Hepatectomy has been considered a reasonable treatment for patients with good liver function, such those of Child-Pugh class A. There are a few studies regarding treatments for HCC patients classified as being of Child-Pugh class B. The aims of this retrospective analysis were to clarify the prognostic factors after hepatectomy in patients with HCC classified as Child-Pugh class B and to delineate the selection criteria of hepatectomy.

Methods: Nine hundred nineteen patients with HCC underwent hepatectomy as initial treatment at our institute between 1986 and 2008. Among these patients, 150 patients with HCC classified as Child-Pugh class B who had been followed up for 1 or more years were enrolled in this retrospective study (Hx group). The prognosis was compared with 23 patients with HCC who underwent living donor liver transplantation (LDLT) for HCC of Child-Pugh class B at our institute between 1991 and December 2008 (LT group). Univariate and multivariate analyses were performed to identify prognostic factors.

Results: The overall survival rate of the Hx group was significantly worse than that of the LT group (5-year; 36.0% vs. 78.3%, P = 0.001). In multivariate analyses, diabetes mellitus (P = 0.011), preoperative total bilirubin level >1.5 mg/dl (P = 0.038), and Child-Pugh score of 8 or 9 (P = 0.038) were independent prognostic factors. The overall survival rates of 32 patients who underwent curative hepatectomy for HCC with none of the 3 adverse prognostic factors within Milan criteria were tend to be lower than those of patients who underwent LT within Milan criteria, but there was no statistical significant difference between the 2 groups (90.6% and 70.9%, and 47.2% at 1, 3, and 5 years) (P = 0.213).

Conclusion: Hepatectomy can be indicated as the initial treatment for HCC patients of Child-Pugh class B with none of the 3 adverse prognostic factors, whereas LT should be

considered the initial treatment for patients of Child-Pugh class B with one or more adverse prognostic factors.

FOS147
INTRAOPERATIVE ABLATION FOR SMALL HCC NOT AMENABLE FOR PERCUTANEOUS RADIOFREQUENCY ABLATION IN CHILD A CIRRHOTIC PATIENTS

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Introduction: Radiofrequency ablation (RFA) was initially started by radiologists as a percutaneous treatment, but surgeons started to use RFA by surgical approach for patients with tumors at locations difficult for the percutaneous procedure. The objective of this study was to evaluate the results of intraoperative RFA for small HCCs (<3 cm) in locations difficult for a percutaneous approach in child A cirrhotic patients due to hepatitis C infection.

Methods: 247 patients who had small solitary HCC (<3 cm) were treated; 196 underwent percutaneous RFA while 51 patients presented at sites not amenable for percutaneous route. 27/51 patients (53%) had segmentectomy or subsegmentectomy, while 24/51 patients underwent intraoperative RFA. The locations of the tumors were hepatic dome in 17 patients (9 resections, 8 RFA), near gall bladder in 8 patients (5 resection, 3 RFA), near hepatic flexure in 6 patients (all resection), subcapsular near stomach in 4 patients (all resection), central in 7 patients (all RFA), and caudate lobe in 9 (3 resections, 6 RFA). One month later, treatment response was assessed by contrast material-enhanced computed tomography (CT) then performed every 2–3 month.

Results: The depth of the tumor from the liver capsule was the only significant factor in the choice of the surgeon between resection and RFA. RFA was successful in all tumors (complete ablation rate of 100%). In surgery group, all patient achieved R0 resection. Complication rate was comparable (P = 0.17). After a median follow-up of 20 months (range, 8–30 months), no tumors showed neither local progression nor local recurrence. During the follow-up period, no significant difference was observed between two groups as regards early recurrence, number of denovo lesions (P = 0.2). One-year and 3-year survival rates were 91% and 68%, respectively, in the resection group comparable to the corresponding rates of 89% and 62% in the RFA group (P = 0.1).

Conclusion: For small HCC in locations difficult for a percutaneous approach, intraoperative RFA can be an alternative option for deep seated tumors necessitating more than one segmentectomy achieving similar tumor control, overall and disease-free survival.

FOS148
SERUM OSTEOPONTIN LEVEL AS A TUMOR MARKER IN HEPATOCELLULAR CARCINOMA

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Introduction: HCC is currently the third leading cause of cancer related deaths world wide. In Egypt, HCC epidemic is associated with HCV infection; where Egypt has the highest prevalence of HCV in the world with 13.8% of the population infected. AFP can be used to help define patients at risk, but appears to have limited utility as a screening test. The aim of the present work is to study the significants of serum Osteopontin (OPN) level as a serological marker in HCC with and without metastasis.

Methods: This study was conducted on 80 patients divided into 4 groups; group I: HCC patients with metastasis, group II: HCC patients without metastasis, Group III: Cirrhotic patients, Group IV: healthy subjects. All patients were subjected to Laboratory investigations including Liver Biochemical profile, Serum AFP, HBs Ag., HCV Ab and Serum Osteopontin Level. Severity of Liver disease was graded according to Child Pugh Score. Radiological investigations including chest X ray, CT chest, Triphasic CT abdomen and Bone scan in suspected cases. HCC staging according to Barcelona Clinic Liver Cancer Staging (BCLC).

Results: In HCC patients with metastasis, Serum OPN at the best cut-off value (9.6 ng/ml) had sensitivity of 100%, specificity of 95%, positive predictive value (PPV) of 95.24%, and negative predictive value (NPV) of 100%, area under the curve (AUC = 0.993). While, in HCC patients without metastasis; OPN at a cut off value (9.6 ng/ml) had a sensitivity of 100%, specificity of 95%, PPV of 95.24%, NPV of 100%, AUC = 0.993. Serum OPN levels were not affected by age or sex. again, no significant difference in serum OPN levels according to Child score neither in HCC patients nor in patients wih metastasis. Serum OPN levels were not affected by tumor size, presense of portal vein thrombosis or lymph nodes involvements or BCLC staging or MELD Score.

Conclusion: Osteopontin (OPN) had a 100% sensitivity and 95% specificity in HCC patient with or without metastasis at a cut-off value of (9.6 ng/ml); this is the value above which we can predict HCC, while AFP was less sensitive and less specific. OPN was significantly higher in HCC patients with metastasis than in HCC patients reflecting the importance of metastatic workup.

FOS149

SYSTEMATIC SEGMENTECTOMY FOR THE HEPATOCELLULAR CARCINOMA IN THE POSTERIOR AND SUPERIOR SEGMENTS

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Introduction: Systematic segmentectomy, limited anatomical resection, is useful in treating small hepatocellular carcinoma (HCC) in the cirrhotic liver. However, anatomical segmentectomy of posterior and superior segment (segment VII, VIII) is technically demanding either with Glissonian approach or systematic approach due to deep location of vascular pedicles, absence of anatomical landmark and variable anatomy of portal branches.

Methods: From January 2001 to May 2011, systematic segmentectomy by dye injection method was performed in 68 patients. We evaluated efficiency of systematic segmentectomy with ultrasonogram guided dye injection into the portal branches that feed tumor bearing segments including posterosuperior segments. The type of tumor-feeding portal vein (PV) branch, perioperative outcome and survival rates were analysed retrospectively.

Results: For the variation of portal venous branches, of 71 masses in 68 patients, 38 masses (55.9%) were fed by single magistral PV (Type 1) and in 17 masses (25.0%) by a couple of PV branches (Type 2), 11 masses (16.2%) were supplied partially by only one portal venous branch (Type 3). In 5 patients (7.4%), masses were supplied by several small distributed PV. For the type 1 & 2, the tumor bearing segment was resected anatomically by stain, for the type 3 was partially stained and the opposite side was demarcated with counter stain, and dye injection could not perform. In 32 patients, masses were located in seg V, VI and in remaining 36 patients, masses were located in the segment VII & VIII.

Conclusion: Systematic segmentectomy by dye injection method is safe and effective for performing anatomical segmentectomy in particularly for the segment 7 or 8. Although it is not feasible in a few patients (Type 4), this method makes overcome variation of portal venous tributaries of segments and can do according to the natural segment instead of artificial division.

FOS150

TRANSIENT TELOMERE DYSFUNCTION INDUCES CHROMOSOMAL INSTABILITY AND PROMOTES CARCINOGENESIS IN TELOMERASE-PROFICIENT MICE

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Introduction: A current concept indicates that telomere dysfunction can increase liver cancer initiation by induction of chromosomal instability, but initiated tumor cells need to reactivate telomerase for genome stabilization and tumor progression. However, this concept has not been proven in vivo since appropriate mouse models were lacking.

Methods: Here, we analyzed hepatocarcinogenesis (i) in a novel mouse model of inducible telomere dysfunction on a telomerase-proficient background, (ii) in telomerase knockout mice with chronic telomere dysfunction (G3 mTerc-/-), and (iii) in wild-type mice with functional telomeres and telomerase.

Results: Transient or chronic telomere dysfunction enhanced the rates of chromosomal aberrations during hepatocarcinogenesis, but only telomerase-proficient mice exhibited significantly increased rates of macroscopic tumor formation and cancer cell proliferation in response to telomere dysfunction. In contrast, telomere dysfunction resulted in pronounced accumulation of DNA damage, cell cycle arrest and apoptosis in telomerase-deficient liver tumors.

Conclusion: Together, these data provide the first in vivo evidence that telomere dysfunction can promote chromosomal instability and carcinogenesis in telomerase-proficient mice in the absence of additional, genetic checkpoint defects at germline level. This supports the stepwise role of crisis and telomerase reactivation during tumor initiation and progression in hepatocarcinogenesis.

FOS151

HILAR DISSECTION VERSUS "GLISSONEAN" APPROACH FOR MAJOR HEPATECTOMIES: SURGICAL OUTCOME

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Introduction: Effective treatment for HCC includes liver resection, and one of the main determinants of surgical outcome is remaining liver volume. One of the most promising techniques which allows easy liver resection is the "Glissonean" approach. This technique can increase remaining liver volume and reduce intraoperative hemorrhage. The current study has been carried out to assess surgical outcomes of "Glissonean" approach in patients with HCC treated at the National Cancer Center of Mongolia.

Methods: Between 2008 and 2010, 346 patients with hepatocellular carcinoma underwent a liver resection at the National Cancer Center of Mongolia. Of these patients, 65 who underwent major resection involving more than 3 segments according either to the "Glissonean" (n = 26 pts) or to the traditional (n = 39 pts) technique were analyzed retrospectively. Surgical and six-month survival outcomes of the two groups were compared.

Results: Apart from a higher rate of cirrhotic liver parenchyma in the "Glissonean" group (38 vs 21%), there were no differences in terms of demographic characteristics, hepatitis B and C infection rate, pre-operative laboratory parameters, size of tumor and its stage according to the TNM classification. As expected, the "Glissonean" approach significantly shortened the duration of surgery (207 ± 52 vs 265 ± 127 min, X ± SD), (p = 0.03) and decreased the intraoperative blood loss (358 ± 294 vs 747 ± 951 ml) (p = 0.052). Six months after surgery, the higher survival rate in the "Glissonean" group was not different than that of the other group (81 vs 69%).

Conclusion: In our hands, both techniques are effective for treating the hilar structures but we have found a shorter overall operative time and reduced bleeding when using the "Glissonean" approach. This technique is our preference particularly for resecting tumors located in segments five and eight in order to preserve functional liver parenchyma.

FOS152

EARLY PREDICTOR OF MORTALITY DUE TO IRREVERSIBLE POSTHEPATECTOMY LIVER FAILURE IN PATIENTS WITH HEPATOCELLULAR CARCINOMA

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Introduction: Although mortality after liver resection has declined, posthepatectomy liver failure (PHLF) remains a major cause of operative mortality. There was not a consensus of definition for PHLF. However, there have been many efforts to define PHLF causing operative mortality. We sought to identify early predictors of mortality due to irreversible PHLF.

Methods: We retrospectively analyzed the medical records of 359 patients with hepatocellular carcinoma who underwent liver resection from March 2000 to December 2010. Various biochemical parameters were analyzed on postoperative days (PODs) 1, 3, 5, and 7, and compared with "50-50" criterion.

Results: Operative mortality was 4.7%. Bilirubin; 2.2 mg/dl and international normalized ratio 1.35 on POD 5 showed only significant difference compared with "50-50" criterion. The new combination of bilirubin and international normalized ratio (INR) showed higher sensitivity, area under the curve and similar accuracy (sensitivity 78.6% vs. 28.6%, p = 0.002; area under the curve 0.8402 vs. 0.6396, p = 0.00176; accuracy 88.6% vs. 93.4%, p = 0.090). Multivariate analysis revealed the combination of bilirubin; 2.2 mg/dl and INR; 1.35 on POD 5 as an only independent predictive factor (odd ratio, 82.29; 95% confidence interval 8.69–779.64; p < 0.001).

Conclusion: In patients with chronic liver disease who will undergo liver resection, the combination of bilirubin; 2.2 mg/dl and INR; 1.35 on POD 5 may be more sensitive predictor for mortality due to PHLF. Though it needs to validate by prospective study, it may be applied to select patients receiving artificial liver supports or liver transplantation.

FOS153

LAPAROSCOPIC LIVER RESECTION FOR T1 AND T2 HEPATOCELLULAR CARCINOMA

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Introduction: Laparoscopic liver resection has gained much popularity in recent years, but relatively few centers have performed laparoscopic hepatectomies in hepatocellular carcinoma (HCC) patients due to the technical difficulties. We now present our early experience with laparoscopic liver resection in HCC performed in a single institution.

Methods: From January 2008 until February 2011, total 761 patients of hepatectomy was done and we excluded TNM stage 3, tumors over 7 cm and location of tumors of segment I, VII, VIII. 82 laparoscopic liver resections were performed and open conversion was 13 cases (15.8%). To reduce selection bias we made a propensity case matching and made a control group as twice number. We analyzed 69 laparoscopic liver resection cases and 138 open liver resection cases.

Results: Edmondson grade, microvascular invasion, tumor size, TNM stage, preoperative AFP level and cirrhosis were comparable with each group. Also we matched the range of operation as resection less than 2 segments more than 2 segments. We found that the length of hospital stay was shorter in laparoscopic resection group than open resection group (9.5 days vs 13.2 days, $p = 0.018$), the postoperative complication rate was lower in laparoscopic resection group (8.7% vs 22.5%, $p = 0.015$) EBL and margin were not different in each group. 3 year disease free survival in laparoscopic resection group was 35.3% and open resection group was 51.6% ($p = 0.409$). 3 year survival rate in laparoscopic resection group was 81.3% and open resection group was 90.2% ($p = 0.590$).

Conclusion: Laparoscopic liver resection for HCC can be a feasible and safe operative method in early stage HCC. To draw a final conclusion, randomized control study and long term follow up is needed.

FOS154
IS IT POSSIBLE TO REDUCE THE BLEEDING IN HEPATIC RESECTIONS WITHOUT CONDUCTING TOTAL OR PARTIAL VASCULAR EXCLUSION?: RESULTS OF THE USE OF BIPOLAR RADIOFREQUENCY WITH COLD NEEDLES

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Introduction: Although the resection is the chosen procedure in the therapeutic treatment of liver malign lesions, the bleeding represents a factor of morbidity with a great impact in the hepatic surgery. With the means of minimizing this complication, several technological options have been utilized, being radiofrequency more recently among them, allowing the procedure to be realized with smaller incisions, without the need of vascular clamping, with minimum hepatic dissection, or bleeding.

Methods: Sixty patients were submitted to hepatic resection through the use of bipolar radiofrequency. The preoperation bleeding was evaluated through the medication of the collected volume in the vacuum and by the weight difference in the compresses utilized during the procedure. All cases were monitored in their hepatocitary function through laboratory tests during the first week of the postoperative period.

Results: Hepatic resections were realized with the mean of 87 minutes, mean incision size of 14 cm and mean bleeding of 58 ml. None of the patients received blood transfusion or derivatives. Central venous catheters were not utilized. All patients obtained fast anesthetic recuperation, leaving the recuperation room to the ward in less than 12 hours. The postoperative drainage was noted down until the drain removal occurring in all patients. The mean hospitalization time was of 3.2 days. After the elevation peak of the hepatic function tests in the first three days, all patients presented regression of them.

Conclusion: It is possible, feasible and valid to use radiofrequency needles to perform hepatectomies, even larger ones, reducing bleeding.

FOS155
EARLY HCC: SELECTION OF PATIENTS WHO SHOULD NOT BE TRANSPLANTED

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Introduction: The optimal treatment of early HCC still remains to define. Liver transplantation (LT) is challenged by resection. The main argument to propose LT is based on a better disease free survival. To definitively convince that LT is the best strategy, survival at 10 yr should be considered. This long-term survival may be altered by the immunosuppressive regimen and frequent underlying liver disease recurrence. Resection of HCC with good histological profile and stable liver disease is an alternative.

Methods: The goal of this study was to compare the long-term survival of two options.

Within 20 yr, 406 HCC patients underwent a curative surgery at our institution. Among them, 227 patients underwent liver resection (LR) and 179 were transplanted (LT). In case of resection, a good prognostic profile was defined as follow; single lesion less than 5 cm, no microvascular invasion no satellite nodule, good or moderate differentiation, R0 surgical margin. This population defined the "good prognosis group" (GPG). Among 227 patients, 62 belonged to this selected group.

Among the 179 LT-patients, 40 had a previous LR and 139 patients had primary LT. Overall, 138 met Milan criteria.

Long-term results of LR with or without GPG and LT group were compared.

Results: Among LR, overall 5 and 10-yr survival rates were 80% and 61% for GPG versus 58% and 45% for non-GPG ($p = 0.009$).

In LT group, 5 and 10-yr survival rates were 81% and 75% in the Milan criteria and 54% and 54% beyond the Milan criteria ($p = 0.019$). Milan criteria were evaluated on the explants' specimen.

Overall 5 and 10-yr survival rates were 80% and 61% in GPG LR group and 81% and 75% in Milan criteria LT group, respectively ($p = 0.7$).

Overall 5 and 10-yr survival rates were 80% and 61% for GPG as compared to 65% and 45% for LT group regardless of the Milan status ($p = 0.032$).

Conclusion: In case of early HCC with good histological profile and stable underlying liver disease, an oncological surgical resection challenges LT and gives excellent

long-term results comparable to LT. Resection should be proposed as a first line treatment of HCC.

FOS156
THE UTILITY OF POSITRON EMISSION TOMOGRAPHY IN HEPATOCELLULAR CARCINOMA

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Introduction: Positron emission tomography (PET) using 18F-fluorodeoxyglucose (FDG) is being increasingly used in the field of oncology. For hepatocellular carcinoma (HCC), it has been suggested that it may be an important predictor of outcomes for patients undergoing resection or transplantation. The objectives of our study were to evaluate the prognostic value of FDG-PET in patients with hepatocellular carcinoma and to evaluate the correlation between the standardized uptake values (SUV) and survival outcomes.

Methods: From 1991 to 2011, patients with HCC were identified, who had PET scans done after diagnosis and prior to any treatment. A retrospective chart review was performed and complete follow up with dates of death were obtained until September 2011 from the Government of Quebec registry.

Results: 75 patients were identified. 8 patients had surgical resection, 46 had loco-regional therapy (TACE, DC beads, RFA and microwave ablation) and 21 were transplanted. All resected patients, 3 PET positive (SUV > 4) and 5 PET negative (SUV ≤ 4) were alive at follow-up (median 3 years). For the non-resectable HCC 28 patients were PET positive and 18 negative. On survival analysis using log-rank testing the PET negative patients had higher median survival compared to PET positive (median 3.5 years vs <1 year respectively, p = 0.001). For the transplanted patients, 9 were PET positive and 12 negative. PET negative patients outside Milan had lower survival (median 2.7 years) compared to PET positive patients within Milan criteria (median 4.4 years).

Conclusion: PET scan use can be of value in early prognostication of patients with HCC. PET negative patients had higher survival for the non-resectable HCC. When transplanted, patients with a negative PET had higher survival even outside Milan criteria. PET scan use can be of value in early prognostication of patients with HCC, however its potential role requires further validation in a prospective study.

FOS157
HEPATIC RESECTION FOR HEPATOCELLULAR CARCINOMA WITH BILE DUCT TUMOR THROMBUS

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Introduction: Less than 10% of icteric hepatocellular carcinoma was related to obstruction of bile duct by the tumor. Some patients could be treated by hepatectomy with provision of adequate preoperative management. This study was to examine the outcome of HCC patients with bile duct tumor thrombus who underwent operation.

Methods: From October 1994 to August 2010, 53 HCC patients (1.6%) having bile duct tumor thrombus involving minimum 2nd order branches were treated surgically. These were the first surgical treatment of HCC, and the patients were followed up more than 18 months. Clinical data were reviewed retrospectively and the primary end point was survival after surgical treatment.

Results: Child A was77.4% and 12 patients (22.6%) had cirrhosis. Mean total bilirubin level on admission was 9.8 mg/dL. Biliary drainage was performed in 32 patients (60.4%). Portal vein invasion was accompanied in 24 patients (45.3%). Duration of preoperative management was 44 days and portal vein embolization was performed in 6 patients. Hepatic resection was performed in 49 patients (92.5%). Bile duct resection combined with hepatectomy was performed in 17 patients (32.1%). 5-year overall and disease survival rate were 30.7% and 17.5%. R0 resection of HCC was a significant factor affecting on the overall and disease free survival. When R0 resection was performed, bile duct resection was not affected on the survival, but R0 resection was very difficult in Ueda type III patients without bile duct resection.

Conclusion: Preoperative biliary decompression made us to perform hepatectomy in HCC with bile duct tumor thrombus. R0 resection is very important for good prognosis and hepatectomy with bile duct resection should be performed actively in Ueda type III patient, similar to Klatskin's tumor.

FOS158
THE CLINICAL STUDY OF PRECISE HEMIHEPATECTOMY GUIDED BY MIDDLE HEPATIC VEIN

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Introduction: To preoperatively analyze the feasibility of evaluation for hepatic veins, as well as evaluate the safety and therapeutic efficacy of precise hemihepatectomy guided by middle hepatic vein.

Methods: Thirty patients with ongoing hemihepatectomy from October 2008 to September 2009 in Nanjing DrumTower hospital were subjected to multi-slice helical CT hepatic venography preoperatively in order to achieve Nakamura's and Kawasaki's classification of hepatic veins for individual

operative program performed by the guidance of middle hepatic vein with intraoperative ultrasound. The clinical data of these patients were compared with another 38 hemihepatectomy patients (control group) from October 2007 to September 2008 in Nanjing DrumTower hospital. The amount of intraoperative bleeding and blood transfusion, liver function recovery, postoperative complications and 1-year follow-up data were compared between two groups.

Results: The ratios of Nakamura's classification type I, II, III of hepatic veins were 56.7% (17/30), 26.7% (8/30), and 16.7% (5/30), respectively. The amount of intraoperative bleeding and blood transfusion, as well as serum alanine aminotransferase, total bilirubin, and cholinesterase of the third postoperative day between the two groups. However, negative resection margin and albumin level were more favorable in precise hemihepatectomy group than anatomical hemihepatectomy group. In addition, the incidence of postoperative pleural effusion and seroperitoneum was decreased significantly by precise hemihepatectomy. The 1-year tumor-free survival rate was 79% (15/19) in PH group, which is 48% in RH group.

Conclusion: Preoperative evaluation of hepatic veins is of great value for sound individual operative program via determination of anatomical type of hepatic veins. Precise hemihepatectomy could reserve functional liver tissue with complete venous return to a great extent, so make fewer incidences of postoperative pleural effusion and seroperitoneum. Precise hemihepatectomy also has the potential of achieving more adequate tumor-free resection margin, which may result in higher tumor-free survival rate.

FOS159
VARIABLES RELATED TO COMPLICATIONS AFTER LIVER RESECTION FOR HEPATOCELLULAR CARCINOMA IN THE ELDERLY

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Introduction: Previous studies have showed that liver resection can be safely performed in the well selected elderly patients with hepatocellular carcinoma (HCC). However, few studies have reported the predictive factors associated with postoperative complications. The aim of this study is to analyze the risk factors in elderly patients (≥75 yr) using multiple logistic regression.

Methods: A total of 105 elderly patients underwent 115 hepatectomies for HCC, including 94 initial and 21 repeat liver resections, at a single medical center from 1990 to 2010. Pre, intra-, and postoperative clinico-pathological variables were analyzed.

Results: There was no 30-day mortality, but one in-hospital death (mortality rate of 0.9%). Postoperative complications were observed in 44 patients (38%) with major complication rate of 12%, classified as grade III to IV of the Clavien-Dindo system. Using multiple logistic regression, a factor associated with overall complications was presence of two or more preoperative comorbidities {odds ratio (OR), 2.92; 95% confidence interval (CI), 1.27–6.71}. Variables related to major complications were: packed red cell transfusion (OR, 6.14; 95% CI, 1.30–28.9) and albumin level <3.8 g/dL (OR, 5.05; 95% CI, 1.19–21.3).

Conclusion: Liver resection in the elderly can be performed with a very low mortality and an acceptable morbidity. In order to prevent major complication, every effort should be made to reduce the amount of intraoperative blood loss especially in patients with impaired liver function.

FOS160
STAGING CIRRHOSIS TO NARROW DOWN THE INDICATIONS OF LIVER TRANSPLANTATION IN PATIENTS WITH SINGLE HEPATOCELLULAR CARCINOMA FULFILLING THE MILAN CRITERIA

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Introduction: Both liver transplantation and resection are effective treatments for single hepatocellular carcinoma (HCC) fulfilling the Milan criteria, however, their indications are still controversial in those patients with Child-Pugh A liver disease.

Methods: 276 consecutive patients with single HCC fulfilling the Milan criteria underwent either liver transplantation (n = 20) or resection (n = 256) from 2001 to 2009. Liver cirrhosis was staged as none, mild, moderate and severe grade by the Laennec scoring system. The patients with Child-Pugh A in the resection group (n = 241) were stratified to the subgroups with none or different grades of cirrhosis, and the survivals of these subgroups were then analyzed.

Results: The 5-year recurrence-free and overall survival rates after resection were 68.5% and 92.5%, respectively, for the subgroup of no cirrhosis, 63.4% and 85.9%, respectively, for the subgroup of mild cirrhosis, and 28.6% and 50.4%, respectively, for the subgroup of moderate/severe cirrhosis. There was no significant difference between the subgroups of no cirrhosis or mild cirrhosis and the transplantation group in recurrence-free survival and overall survival, whereas the recurrence-free and overall survival in the subgroup of moderate/severe cirrhosis were significantly poorer than those in the transplantation group.

Conclusion: Liver resection achieves similar outcomes as transplantation in patients both with single HCC fulfilling the Milan criteria and without cirrhosis or with Child-Pugh A mild cirrhosis. The indications for liver transplantation could be narrowed down through evaluation on liver cirrhosis. Liver biopsy should be recommended before liver transplantation for single HCC fulfilling Milan criteria.

FOS161

A NEW HEPATECTOMY BASED ON A HYBRID CONCEPT OF PORTAL PERFUSION OF ANTERIOR SEGMENT AND VENOUS DRAINAGE AREA OF SUPERIOR RIGHT HEPATIC VEIN

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Introduction: Detailed 3D-image revealed that portal perfusion area in cranial side of anterior segment sometimes surrounded superior right hepatic vein (SRHV). In such patients with HCC, SRHV should be resected for systematic resection. This study aimed to clarify characteristics of patients with SRHV surrounded by portal perfusion area of anterior segment, and propose a new hepatectomy based on a hybrid concept of portal perfusion of anterior segment and hepatic venous drainage area of SRHV.

Methods: <SRHV-involvement> 3D-CT images of 66 patients without having tumors in the right lobe were constructed using a software of SYNAPSE VINCENT (Fujifilm Corp, Japan). "SRHV-involvement" was defined as involvement of more than 1 cm of proximal site (near the root) of SRHV surrounded by portal perfusion area of anterior segment.

<Procedures> The procedures are as follows: 1) encircling of anterior Glissonian pedicle, SRHV and inferior right hepatic vein (IRHV), 2) confirmation of demarcation line of anterior segment by occluding Glissonian pedicle and demarcation (congested) line by clamping proper hepatic artery and SRHV, and 3) IRHV-preserved complete resection of portal perfusion area plus drainage area of SRHV, combined with SRHV resection.

Results: <SRHV-invlvement> SRHV-involvement was observed in 17 out of 66 patients (26%). The large IRHV (more than 5 mm in diameter) was found in 16 out of 66 patients (24%). In patients with SRHV-involvement, the incidence of a large IRHV (8 of 17: 48%) was significantly higher, compared to that in those without SRHV-involvement (8 of 49: 16%).

Two patients having a large IRHV and HCC near the root of SRHV underwent a IRHV-preserved hepatectomy combined with SRHV resection (S8 + SRHV-drainage area in 1 and anterior segment + SRHV-drainage area in 1). Postoperative CT scan revealed complete resection of drainage area of SRHV and no congestion in the remnant posterior segment after hepatectomy due to excellent drainage through a large IR.

Conclusion: The incidence of SRHV-involvement was not so rare, and half of those with SRHV-inclusion had a large IRHV. In such HCC patients having a large IRHV, our new hepatectomy based on a hybrid concept of portal perfusion of anterior segment and venous drainage area of SRHV, combined with SRHV resection, is a promising option from the viewpoint of systematic resection (curability) and functional reserve of the future remnant liver.

FOS162

ONE HUNDRED LAPAROSCOPIC LIVER RESECTION FOR HEPATOCELLULAR CARCINOMA COMPLICATING CHRONIC LIVER DISEASE

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Introduction: Laparoscopic liver resection (LLR) was developed by a limited number of teams over the past 10 years. LR for solitary HCC in Child A patient is still controversial because of high mortality and morbidity.

We report here the first 100 patients.

Methods: From November 1998 to August 2011, 303 patients underwent liver resection for HCC complicating chronic liver disease. Among them 100 (33%) were performed under laparoscopy. Tumors were 10 cm or less in size and located in antero-lateral segments. Liver disease was due to hepatitis B or C in 58 patients, alcohol in 23, NASH in 7 and others causes in 12. Five-port CO2 laparoscopy was used and the specimen was extracted in a bag through a separate lower abdominal incision.

Results: One segment or less was resected in 61 patients including anatomical resection in 13. Other resection included 30 left lateral sectionectomies, 7 right hepatectomies and 2 left hepatectomies. 14 conversions to laparotomy occurred for moderate hemorrhage in 6 cases and insufficient exposure in 5. 10 conversions occurred in resections of one segment or less. One cirrhotic patient died on POD 10 from cardiac insufficiency after uneventful LLS. According to Clavien's classification, complications were grade I, II, III, IV in 7, 6, 2 and 6 cases respectively. After a mean follow-up of 37.9 months, 51 patients developed tumor recurrence. 19 patients underwent orthotopic liver transplantation. Overall and disease free 3-year survival rates were 66% and 36% respectively.

Conclusion: Our study shows that laparoscopic liver resection for HCC in selected patients is a safe procedure with good mid-term results. This approach could have an impact on the therapeutic strategy of HCC complicating chronic liver disease especially in the field of liver transplantation.

FOS163

UPFRONT LIVER RESECTION IS NOT APPROPRIATE FOR PATIENTS WITH HEPATOCELLULAR CARCINOMA AND HEPATITIS C ELIGIBLE FOR LIVER TRANSPLANTATION

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Introduction: Recent data support liver resection (LR) as first-line approach in patients with preserved liver function

who have resectable hepatocellular carcinoma and are also eligible (<3 nodules, <5 cm) for liver transplantation (LT). This retrospective study assesses the influence of hepatitis C virus infection (HCV) on the outcome of patients who underwent upfront LR for HCC, but who were also eligible for LT.

Methods: Between 1995 and 2010, 75 patients (65 men, mean age 65 ± 10 years) with HCC who were eligible for LT were treated by LR. The underlying hepatic disease was related to HCV in 30 (42%) patients, virus B infection (HBV) in 15 (21%) patients, alcohol abuse in 26 patients (36%) and other in 10 patients (13%). Fifty five (73%) patients had cirrhosis (METAVIR F4). All patients were Child A. Major liver resection was performed in 9 (12%) patients. Intermittent clamping of the hepatic pedicle was used in 41 (55%) patients. Treatment of recurrence included repeat LR in 10 patients (13%) and salvage LT in 9 (12%) patients. Survival curves were calculated according to Kaplan-Meier and compared with the Log-Rank test.

Results: Operative morbidity and mortality rates were 37% and 5% respectively. At 1, 3 and 5 years, overall (OS) and disease free (DFS) survival rates were 81%, 69%, 55% and 56%, 31%, 21% respectively. On univariate analysis, HCV infection ($p = 0.012$) and preoperative AST over 70 U/l ($p = 0.03$) were associated with decreased OS. On multivariate analysis, HCV infection was the only independent factor associated with decreased OS ($p = 0.02$). On univariate and multivariate analysis, HCV infection ($p = 0.05$) and hepatic pedicle clamping ($p = 0.003$) were associated to decreased DFS. The 1, 3 and 5 years OS and DFS rates in patients with HCV related HCC were 69%, 53%, 38% and 50%, 18%, 9% respectively.

Conclusion: Overall and disease free survival after liver resection in patients with HCV related HCC and preserved liver function is poor. Liver transplantation should be considered as first line treatment in these patients.

FOS164
INCREASED EXPRESSION OF HOMEOBOX B9 IS ASSOCIATED WITH POOR PROGNOSIS IN PATIENTS WITH HEPATOCELLULAR CARCINOMA AFTER CURATIVE RESECTION

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Introduction: Homeobox B9 (HoxB9) alters tumor cell fate and promotes tumor progression and metastasis. And HoxB9 overexpression in breast tumors, by altering the microenvironment, induces several tumorgenic phenotypes and promotes disease progression in vitro and in vivo. To evaluate the clinical significance of HoxB9, we analyzed the association of HoxB9 expression and clinicopathologic characteristics in HCC patients.

Methods: Expression levels of HoxB9 in tumor tissue were evaluated by immunohistochemistry. Its correlation with clinicopathologic parameters and the prognosis for patients with HCC after curative resection were analyzed. Prognostic significance was assessed by Kaplan-Meier survival estimates and log-rank tests. Multivariate analyses were performed to evaluate prognosis-related factors.

Results: HoxB9 was highly expressed in 8 of 30 (26.7%) patients. The mean proportion of tumor cells positively stained with HoxB9 was 78.5% in positive HoxB9 group and 7.3% in negative group. Only intrahepatic metastasis among clinicopathological parameters has correlation with HoxB9 expression ($p = 0.05$). Increased HoxB9 expression in resected HCC predicted lower 1-year disease free survival rates (80.0% v.s. 16.7%, $p < 0.05$), and multivariate analysis revealed HoxB9 overexpression was an independent risk factor for recurrence. Patients with increased HoxB9 had worse 3-year overall survival rates (66.7% v.s. 0.0%, $p < 0.05$), and HoxB9 overexpression was an independent prognostic factor on Cox regression analysis.

Conclusion: This is the first report to show that increased HoxB9 expression is associated with subsequent recurrence and worse survival rates after curative resection of HCC, as well as cancer progression such as intrahapatic metastasis. Thus, HoxB9 may be a novel prognostic biomarker and therapeutic target in HCC.

FOS165
PRE-OPERATIVE PREDICTORS OF MICROVASCULAR INVASION IN CIRRHOTIC AND NON-CIRRHOTIC HEPATOCELLULAR CARCINOMA

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Introduction: Microvascular invasion (MVI) is a key determinant of outcome following curative resection or transplantation for hepatocellular carcinoma (HCC). Determination of pre-operative predictors of MVI in patients with or without cirrhosis may increase our understanding of the underlying tumour biology in these diverse patient groups. This will allow optimisation of treatment selection criteria and patient outcomes.

Methods: Review of a prospective database of 229 consecutive patients undergoing hepatectomy or transplantation for HCC at St James's University Hospital, United Kingdom. Diagnosis was based on published guidelines and incidental tumours excluded. Patients were divided into age matched cohorts based on the presence (115, 50.2%) or absence (114, 49.8%) of cirrhosis. Clinico-pathological characteristics were correlated with survival and MVI. Survival was calculated using the Kaplan-Meir method with Log-rank and Cox stepwise regression for survival comparisons. Univariate Chi-squared and multivariate logistic regression were used to analyse relationships between clinico-pathological variables and MVI ($P < 0.05$ was indicative of statistical significance).

Results: There was a higher incidence of MVI in non-cirrhotic HCC (59.6% vs. 27.8%, $P < 0.001$). In cirrhotic patients recurrence was an independent predictor of overall survival ($P < 0.001$) whilst largest tumour size >5 cm and MVI were independent predictors of disease free survival ($P = 0.027$ & $P = 0.002$). In non-cirrhotic patients only recur-

rence independently predicted overall survival (P = 0.001) whilst multifocal tumours (P = 0.042) and underlying viral aetiology (P = 0.031) predicted disease free survival. Univariate analysis of pre-operative variables revealed MVI was associated with viral aetiology in cirrhotic patients (P = 0.047), and with multifocal HCC and poor differentiation in non-cirrhotic patients (P = 0.04 & P = 0.019).

Conclusion: MVI was an independent predictor of disease free survival only in cirrhotic patients. Viral aetiology was the only significant pre-operative factor associated with MVI in cirrhotic HCC. In non-cirrhotic patients MVI was associated with poor differentiation and multifocality but by itself was not an independent predictor of outcome. Our data reflect differences in the underlying biology of cirrhotic and non-cirrhotic HCC and reinforce the prognostic importance and challenges of predicting MVI.

FOS166
IS LIVER VOLUME AFTER PORTAL VEIN EMBOLIZATION WORTH MORE? A CASE-CONTROL STUDY

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Introduction: Portal vein embolization (PVE) is used before extensive hepatic resections to increase the volume of the future remnant liver within safety margins (>0.6% of the patient's weight). Little is known about the impact of PVE on postoperative liver function. The aims of this study were to assess the impact of preoperative PVE on immediate postoperative liver function following major hepatic resection and to validate/infirm the hypothesis that increase in volume is equivalent to increased function.

Methods: From a total of 68 patients undergoing PVE and right or extended right hepatectomy between 1999 and 2010 we excluded patients older than 70 years or with cirrhosis, and compared the remaining 28 patients (study group: PVE) to 17 donors of right liver grafts for adult-to-adult living donor transplantation who underwent resection on unprepared parenchyma (controls: LD). We first determined whether liver volumes were quivalent between the two groups, and then quantified their postoperative liver function. Statistical analysis was performed using a Student's t-test or a chi-square test (baseline characteristics) and linear regression models (factor V) with mixed effect when necessary (bilirubin levels).

Results: Groups were similar for gender (p = 0.13), size (p = 0.55) and weight (p = 0.06). PVE patients were older than LD (58 vs. 41 years, p < 0.001). Among PVE patients 79% had had preoperative chemotherapy. At the time of surgery, PVE and LD patients had similar total liver volume to body weight ratios (2.26% vs. 2.15%, p = 0.34), similar resected liver to body weight ratios (1.15% vs. 1.05%, p = 0.30), and similar volume of the remnant liver to body weight ratios (1.15% vs. 1.10%, p = 0.58). Analysis of the postoperative bilirubin levels showed significantly lower values from day 3 to 5 after surgery in PVE patients compared to LD (p ≤ 0.01). Factor V levels showed significant higher values in the first two days after surgery in PVE patients compared to LD (p < 0.001).

Conclusion: Our data show that, despite similar remnant liver volumes, the immediate postoperative function was better in the previously stimulated than in the unprepared remnant liver (in spite of older age and chemotherapy). Consequently, current threshold figures for safe liver volumes in patients having undergone PVE may need to be revised.

FOS167
IMPROVING SURGICAL OUTCOMES AFTER RESECTION FOR HEPATOCELLULAR CARCINOMA OVER 10 YEARS

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Introduction: Hepatic resection has been considered the treatment of choice for hepatocellular carcinoma (HCC) in patient with preserved liver function. Some studies have reported that long-term outcomes as well as perioperative outcomes have improved over the past two decades. Therefore, we attempted to demonstrate whether there has been improvement of surgical outcomes of curative resection of HCC from single center experience of hepatic resection for HCC over a 10-year period.

Methods: From January 1996 to December 2007, 610 patients underwent curative resection for HCC at Yonsei University Health System, Seoul, Korea. First, the long-term outcomes after resection were analyzed and the prognostic factors for disease and overall survival were investigated. Second, the patients were divided according to two time periods: before 2003 (group1, n = 233) and after 2003 (group 2, n = 377). The clinicopathological data and survival results were compared between the two groups.

Results: Perioperative transfusion, multiple tumors, microscopic vascular invasion, Edmondson-Steiner grade (III-IV) and albumin <3.5 g/dL were the independent adverse prognostic factors for overall survival. Although the disease-free survival rates were not significantly different, there tended to be improved overall survival rates in the group 2 (p = 0.098). Although there were no significant differences in disease-free and overall survival in patients with tumor size <3 cm, the group 2 showed a significantly higher overall survival in patients with tumor size >3 cm (p = 0.012). The group 2 in patients with tumor size >3 cm had a significantly lower proportion of blood transfusion and serum albumin <3.5 g/dL.

Conclusion: Long-term outcomes after curative resection of HCC were associated with underlying liver function, tumor invasiveness and surgical techniques. The improving survival results in patients with tumor size >3 cm in recent 5 years may be attributable to the proper selection of surgical candidate, reduced perioperative transfusion rate as a result

of improved surgical techniques and active multimodality treatment of recurrent HCC.

FOS168
IS THE EXTENDED CRITERIA FOR LT JUSTIFIED IN THE ERA OF LIVER TRANSPLANTATION

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Introduction: In the era of transplantation, the indication of LT was expanding. However, there were still some debates about the application of liver transplantation (LT) or liver resection (LR). One of major issue is about the extending criteria of LT beyond Milan criteria. However there was no consensus which was the acceptable cut off level for extending criteria of LT. We investigated the outcome of LRs of beyond Milan criteria group.

Methods: From January 1986 to October 2011, total of 541 curative Hepatectomy for hepatocellular carcinomas were performed in department of surgery of Korea Cancer Center Hospital, Seoul, Korea. We reviewed the medical records and clinical outcome of the patients who underwent hepatectomy was analyzed.

Results: Median age was 54 years old and Median follow up period was 57 months. Most of them were male (80%) and HBsAg positive (82%). Among them, there were the 235 patients beyond Milan criteria. 5, 10 year OS of total population were 59.44% & 40.2%, and 5, 10 year DFS were 44.6% & 34.6% respectively. Within Milan criteria group, 5 year OS & DFS were 68.4% and 48.3%, and beyond Milan Group, 48.8% and 26.7%. The factors affecting the prognosis were Child-Pugh classification, Tumor size, gross venous invasion and postoperative complication. The 5 OS and DFS of the favorable group (beyond Milan criteria and Child A, no gross venous invasion, size less than 10 cm, no complication) were 61.0% and 49.6%.

Conclusion: Nowadays, the indication of LT is tending to expand beyond Milan criteria, and there was some debate about application of LT or LR. But there was no consensus beyond Milan group. In the group: beyond Milan but favorable group, the outcomes of LR were comparable to LT group. The extension of LT criteria should be carefully considered.

FOS169
MULTIPOLAR RADIOFREQUENCY ABLATION FOR THE TREATMENT OF HCC USING NO TOUCH TECHNIQUE

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Introduction: To prospectively evaluate the safety and effectiveness of of extranodular percutaneous multipolar radiofrequency (RF) ablation "no touch multipolar radiofrequency ablation technique" for the treatment of hepatocellular carcinomas (HCCs) ≤45 mm of diameter.

Methods: One hundred and seven naïve patients (80 male, mean age: 65 years (44–82 years) with cirrhosis (Child-Pugh class A; 84 /class B; 23) and one, two or three (84/21/2) HCCs (median size: 24 mm (10–45 mm; 40 ≥ 30 mm) were treated with no touch multipolar radiofrequency ablation technique, consisting of simultaneous insertion and activation of two to four bipolar coaxial electrodes inserted just outside the tumors.

The procedures were performed under ultrasonographic guidance. Results were assessed by using computed tomography. Primary effectiveness, complications, tumor progression, and survival rates were recorded.

Results: A complete ablation was obtained in all patients after one (n = 100) or 2 (n = 7) sessions. The mean number of electrodes used per tumor ablation was 3 (4 electrodes was used in 7 patients). More than one application was necessary in 5 cases, 20 to 330 kJ were delivered per session (mean: 106 kJ), during 10 min to 55 min (mean; 27 mm).

One patient died of ascites infection 2 months after the procedure; one patient experienced jaundice (1) and another hemothorax.

After a median follow-up of 23 months, four local and 44 distant HCC recurrences were detected. At the end point, 27 patients died and 6 patients were transplanted. The 3-year HCC local, distant tumor progression and survival rates were (5) x% and (40) % respectively.

Conclusion: Multipolar radiofrequency ablation of HCC using no touch technique seems to be a very effective method in term of local tumor control.

FOS170
MINIMALLY INVASIVE LIVER RESECTION FOR HEPATOCELLULAR CARCINOMA WITH LIVER CIRRHOSIS: SINGLE CENTER EXPERIENCE

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Introduction: Surgical resection for operable hepatocellular carcinoma (HCC) combined with liver cirrhosis in Child-Pugh class A showed excellent outcome. However, there are some risks intra-operatively and postoperatively in patients with underlying liver cirrhosis. Minimally invasive liver resection (MILR) can be another option for this risk. However, this is still controversial, especially for HCC. The

aim of this study was to investigate the outcome of MILR for HCC with liver cirrhosis in our center.

Methods: We performed a retrospective analysis of patients who underwent MILR for HCC. Between 2000 and 2011, total 39 patients were tried to undergo MILR. Preoperatively, HCC was diagnosed with blood test and ultrasonography, computed tomography or magnetic resonance imaging. Among 39 patients, 23.1% patients (n = 9) were converted to open surgery due to difficult approach (n = 5), bleeding (n = 2), seeding risk (n = 1), hypotension after carbon dioxide gas inflation (n = 1). Finally, 30 patients underwent MILR for HCC (25 males and 5 females; mean age 56.0 years, range 32 to 75). All cases had underlying liver cirrhosis in Child-Pugh class A (23 hepatitis B virus-related, 76.7%; 3 hepatitis C virus-related, 10.0%; 3 unknown causes, 10.0%; 1 alcoholic, 3.3%).

Results: Of the resections, 43.3% were performed totally laparoscopic, 36.7% laparoscopy assisted, 16.7% hand-assisted, and 3.3% thoracoscopic trans-diaphragmatic. Non-anatomical and anatomical resection was 70 and 30%. Mean operative time was 200 minutes and there was no intraoperative transfusion, no operation related death, liver failure or severe complication except minor bile leak (n = 1). Oncologically, tumor size was mean 3.5 cm (range 1.2–12) and all surgical margins were negative. Overall mortality was 13% due to HCC recurrence and overall HCC recurrence was in 41.9% (time interval, mean 10 months). Port site related HCC seeding was in one case. The 1-year/3-year overall and disease-free survival rates were 78.6/75% and 53.6/50%, respectively.

Conclusion: In experienced hands, minimally invasive liver resection can be safe and oncologically acceptable as a treatment option for HCC with underlying liver cirrhosis in Child-Pugh class A. However, meticulous caution is demanded because of the risk for port site related recurrence or seeding of HCC.

FOS171

LIVER HANGING MANEUVER, A MILESTONE IN THE HISTORY OF LIVER SURGERY – THE REPORTS OF 410 CASES IN CHINA

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Introduction: In 2001, Liver hanging maneuver (LHM) was firstly described by Jacques Belghiti. Peng firstly introduced this technique into China in 2003. Since then, this maneuver has been widely used in China. The aim of this study is to investigate the safety and indication of liver hanging maneuver for hepatectomy and it's situation in China.

Methods: he following Chinese full text databases which commonly used in China were searched, (1) Wan Fang Data Resource System (http://www.wanfangdata.com.cn/), (2) Wei Pu Chinese Scientific Journal Database (http://www.cqvip.com), (3) Chinese Journal Full Text Database (http://dlib.cnki.net/kns50/). The MESH search term is liver hanging maneuver and/or retro hepatic tunnel. 38 papers were retrieved, including 4 basic anatomy studies, 5 reviews, 3 nursing reports, 21 original papers, 5 clinical control studies. From January 2003 to October 2010, total of 410 cases were reported, the perioperative data of these cases were analyzed.

Results: The cases were from 26 different hospitals, the majority is teaching hospital (84.6%, 22/26), and the others are regional hospitals (15.4%, 4/26). Liver hanging maneuver was performed successfully in 403 cases (98.29%). LHM was given up in 7 cases because of either tumor invasion or bleeding. Right or extended right hemihepatectomy was performed in 289 cases (70.49%), left hemihepatectomy in 60 cases (14.63%), other hepatic resections including caudate lobe resection in 61 cases (14.88%). 1 case died of failure of liver and kidney function (0.2%, 1/410), and overall morbidity is 21.5% (62/288), including bile leakage, pleural effusion, etc.

Conclusion: Liver hanging maneuver is a safe and convenience modality for a great variety of liver resections. As a milestone in the history of liver surgery, this revolutionary technique has been widely applied in China.

FOS172

EVALUATION OF INTRAOPERATIVE MICROWAVE COAGULO-NECROTIC THERAPY (MCN) FOR HEPATOCELLULAR CARCINOMA (HCC): A SINGLE CENTER EXPERIENCE OF 719 CONSECUTIVE CASES

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Introduction: Background Hepatic resection (HRx) or radiofrequency ablation (RFA) may be carried out as first-line treatment of hepatocellular carcinoma (HCC). However, we have used intraoperative microwave ablation, named microwave coagulo-necrotic therapy (MCN) as a part of treatment strategies of HCCs for longer than 15 years. Now we will report to describe the treatment outcomes achieved at our institution as a high volume center of microwave ablation.

Methods: 719 consecutive patients received MCN as their initial therapy for HCC in our institute between July 1994 and December 2010.

Microwaves were generated at a frequency of 2450 MHz. We used two types of needle; a 16 gage 150 mm long needle or a 21 gage short needle, to suit the conditions of the tumor.

The necrotic area formed with single irradiation was small. Therefore, repeated electrode insertion and irradiation was required to obtain a sufficiently large treated area. MCN was not performed percutaneously, and had three routes of approach to the tumor.; laparotomy, short thoracotomy and under laparoscopy.

Therapeutic survival effect, local tumor progression and overall recurrence were prospectively evaluated and statistically analyzed.

Results: The 1-, 3-, 5-, and 10-year overall survival rates of 719 patients (mean tumor size, 26.9 mm; mean number of lesions, 2.51) were 97.7%, 79.8%, 62.1%, and 34.1%. The 5-year survival rate of Child–Pugh class B (n = 216) was 46.6%. The 5-year survival of patients with ≥4 lesions (n = 168) was 49.6% and that of patients meeting the Milan criteria (n = 470) was 69.6%. The 1-, 3-, 5-,and 10-year overall survival rates for 390 patients treated with MCN who had ≤3 lesions with diameter ≤3 cm were 97.9%, 85.1%, 70.0%, and 43.0%. Under the same conditions no significant differences were found in overall survival rates after MCN and 34 patients treated with HRx in the same period in our institute (P = 0.3592), and in local recurrence rates (P = 0.5926).
Conclusion: MCN is effective for locoregional control of HCC; comparable to HRx. MCN should be considered as one of the first-choice treatments for HCC, even for patients with poor liver function or multiple lesions.

FOS173
LOCALLY ADVANCED HEPATOCELLULAR CARCINOMA (STAGE IVA): ROLE FOR HEPATECTOMY?

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Introduction: The role for hepatic resection in locally advanced hepatocellular carcinoma (stage IVA [T4N0-1M0]) is controversial. The aim of this study was to evaluate whether resection has a role in stage IVA hepatocellular carcinoma and what predictive factors can be used to improve patient selection in a large series.
Methods: Using data from the Surveillance, Epidemiology and End Results (SEER) registries, we identified all patients treated with stage IVA hepatocellular carcinoma over a 4-year period (2004–2008). Patient demographics, tumor-related features, treatment, and survival were analyzed.
Results: Of 448 patients with stage IVA hepatocellular carcinoma, 105 (24%) underwent surgery while 343 (76%) did not. Median survival was 16 months in the surgical group and 3 months in the nonsurgical group. Race, sex, and tumor size were comparable between both groups. Patients were older in the nonsurgical group (mean age 63 vs. 57 years; p = 0.0002) and had more well differentiated tumors (p < 0.0001). Multivariate analysis showed that increased survival was associated with younger age (p = 0.0382; hazard ratio 1.009 [95% confidence interval 1.001 to 1.018]), smaller tumor size (p = 0.0004; hazard ratio 1.004 [95% confidence interval 1.002 to 1.006]), and surgical intervention (p < 0.0001; hazard ratio 2.974 [95% confidence interval 2.189 to 4.040]).
Conclusion: Hepatic resection should be considered in all patients with locally advanced hepatocellular carcinoma (stage IVA). Tumor size and age should be considered to improve selection of patients for surgery.

FOS174
OUTCOME OF PATIENTS WITH RECURRENCE FOLLOWING CURATIVE RESECTION OF HEPATOCELLULAR CARCINOMA

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Introduction: To evaluate the clinical outcome of patients with recurrence following curative resection of hepatocellular carcinoma (HCC).
Methods: Data were retrospectively collected for 338 consecutive patients who had recurrence after curative hepatectomy for 595 HCC patients between April 2001 and July 2008.
Results: Of the 595 patients, 338 had recurrence. The 1-, 3-, 5-year SR after recurrence were 74.5, 51.3 and 38.9%, MST was 40 months. In univariate analysis, age, HBV infection, AFP, transfusion, cell differentiation, size, vascular invasion, satellite nodules, extrahepatic recurrence and stage were significant factors and by multivariate analysis, the extrahepatic recurrence, the satellite nodules (+) remained as independent risk factors. Of 338 recurred patients, 227 had only intrahepatic recurrence, 46 had only extrahepatic and 65 had both. The lung was the most common site of extrahepatic recurrence. survival rates of the IH recurrence group were significantly better than those of EH recurrence group and IEH recurrence.
Conclusion: The extrahepatic recurrence and the presence of satellite nodules were associated with poor survival after a hepatectomy. Even with recurrence following hepatectomy for HCC, long-term survival is common and proper and timely treatment should be applied.

FOS175
MACROPHAGE INFLAMMATORY PROTEIN-1 ALPHA/ CC CHEMOKINE LIGAND 3 AND TUMOR-ASSOCIATED MACROPHAGES IN HEPATITIS C VIRUS-RELATED HEPATOCELLULAR CARCINOMA: RELATION TO TUMOR PROGRESSION AND ANGIOGENESIS

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Introduction: Hepatitis C virus (HCV) is a major risk factor for hepatocellular carcinoma (HCC). Chemokines, which induce leukocyte migration and activate inflammatory response, have recently been implicated in the regulation of tumor growth. Therefore, the aim of the present work was to study the role of macrophage inflammatory protein-1alpha/ CC chemokine ligand 3 (MIP-1alpha/CCL3), a potent mac-

rophage chemoattractant, in the pathogenesis of HCV-related HCC in relation to tumor progression and angiogenesis.

Methods: Thirty patients with HCV-related cirrhosis (15 patients with HCC and 15 patients without HCC) and 15 healthy subjects were enrolled in the study. Serum levels of MIP-1alpha/CCL3 were measured using enzyme linked immunosorbant assay and its sensitivity and specificity in the diagnosis of HCC was determined by plotting receiver-operating characteristic curve. Histological tumor grading was evaluated and the surrounding liver tissue was examined to assess histological activity index (HAI) and steatosis grade. Expressions of MIP-1alpha/CCL3, CD68 [for tumor-associated macrophages (TAM)] and endoglin (CD105) [for determination of microvessel density (MVD)] were studied in HCC and adjacent non-neoplastic liver tissues by immunohistochemistry.

Results: Serum MIP-1alpha/CCL3 levels were significantly higher in cirrhotic patients with and without HCC than in healthy subjects and in HCC patients than in patients without HCC ($P < 0.001$). The sensitivity and specificity of serum MIP-1alpha/CCL3 in the diagnosis of HCC were 100% and 93.3% respectively at a cut-off value of 17.5 pg/ml. HCV-related HCCs showed significant increases in MIP-1alpha/CCL3 expression, TAM count and MVD compared with adjacent non-neoplastic liver tissues ($P < 0.001$). The MIP-1alpha/CCL3 expression in HCCs showed positive correlations with serum MIP-1alpha/CCL3 levels, tumor size, stage and histological grade and intratumoral TAM count and MVD. Also, TAM count was directly correlated with MVD in HCCs ($P < 0.05$).

Conclusion: The CC chemokine MIP-1alpha/CCL3 play an important role in the development and progression of HCC in HCV infection possibly, through migration of macrophages to tumor microenvironment and enhancement of angiogenesis. MIP-1alpha/CCL3 may also serve as a potential serum biological marker and a useful therapeutic target for HCC.

FREE ORALS: LIVER TRANSPLANTATION

FOS176
THIRD LIVER TRANSPLANTATION IN ADULT RECIPIENTS: RESULTS OF A 25-YEAR EXPERIENCE IN A SINGLE CENTRE

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Introduction: Given the critical organ shortage and worse survival of retransplantation, a third transplantation (3rd LT) that gives the only chance of survival for patients with failing two first organs is highly debatable. This study aimed at evaluating results in 34 consecutive patients receiving a 3rd LT to identify long-term outcomes and prognostic factors available at the time of decision of LT.

Methods: From February 1987 to April 2009, 1837 (88%) patients underwent only one LT, 199 (9%) patients underwent a 2nd LT, and 34 (1.6%) patients underwent a 3rd LT (mean age: 36 ± 14 years old). Indications of 3rd LT included rejection (n = 13, 38%), arterial thrombosis (n = 10, 29%), primary non function (n = 5, 14%) and others (n = 6, 17%). Before 3rd LT, 18 (53%) patients were at home, 4 (12%) were hospitalized and 12 (35%) were ICU-bound with vasopressive drugs in 4 (12%) patients. Third LT was elective in 25 (73%) patients and urgent in 9 (27%) patients. Uni- and multivariate analysis were done to detect prognostic factors of survival available at the time of 3rd LT decision.

Results: Post-operative mortality within 90 days of 3rd LT was 5/34 (14%) significantly higher in an urgent procedure ($p = 0.03$). With a mean follow-up of 7 years, 1-, 5-, 8-year patient and graft survival were respectively 85%, 74%, 65% and 85%, 63% and 53%. More specifically, 1-, 5-, 8-year overall survival is 96%, 85%, 73% and 55%, 41%, 41% in elective and urgent procedures respectively (NS). Urea, protide and SGPT were predictive factors of outcome.

Conclusion: Elective 3rd LT is justified in selected patients but this life-saving option must be discussed in urgent situation with caution.

FOS177
ICG-FLUORESCENT IMAGING DURING LIVER SURGERY FOR EVALUATION OF PORTAL UPTAKE FUNCTION OF VENOUS CONGESTED REGIONS

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Introduction: Recently, preoperative 3D-CT enables accurate estimation of liver volumes with venous congestion caused by resection of the major hepatic veins, which can affect postoperative liver function. However, it remains unclear to what extent hepatic function in venous congested regions actually decrease compared with that in non-congested regions. The aim of this study is to evaluate portal uptake function of hepatic regions with and without venous congestion by using ICG-fluorescent imaging technique.

Methods: In 63 patients who underwent liver resection with excision of the major hepatic veins (n = 22) or liver transplantation (recipient, n = 23; donor, n = 18), ICG (0.0025 mg per 1 mL of the remnant liver volume estimated with preoperative 3D-CT) was injected intravenously following resection, harvesting of the liver graft, or reconstruction of hepatic vessels in recipient. Then, fluorescent intensity on liver surfaces was recorded with fluorescent imaging system up to 300 seconds after the injection of ICG, and compared between venous congested regions and non-congested regions.

Results: The slope of fluorescent intensity between 0 and 105 seconds after the injection of ICG, which corresponded approximately to the velocity of portal uptake of ICG, was significantly lower in venous congested regions (median [range]; 0.27 [0.06–0.08]) than in non-congested regions (0.74 [0.15–1.82]; $P < 0.001$). The median value of the ratio of this slope in venous congested regions to that in non-congested regions in each patient was 0.38 (0.15–0.86). Fluorescent intensity at 240 seconds, when it reached a plateau, was also lower in venous congested regions (99 [39–173]) than in non-congested regions (182 [71–255], $P < 0.001$). The ratio of this plateau intensity in venous congested regions to that in non-congested regions was 0.58 (0.26–0.84).

Conclusion: Fluorescent imaging technique enables real-time evaluation of portal uptake function in venous congested regions during liver surgery. In venous congested regions, the velocity and the plateau value of portal uptake of ICG will be approximately 40% and 60% of those in non-congested regions, respectively, although it can range from 20% to 80% probably because of the difference in communication between hepatic vessels in the remnant liver.

FOS178
HEPATIC ARTERY THROMBOSIS AFTER LIVER TRANSPLANTATION: EXPERIENCE OF SINGLE CENTER

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Introduction: Hepatic artery thrombosis (HAT) is a feared complication in the postoperative period of liver transplantation. It is one of the most serious vascular complications in the postoperative period of liver transplantation (LT) and is associated with a significant increase in morbidity, graft loss and mortality.

Methods: This study was retrospectively on period of November 2009 to December 2011, on the Gastroenterology Department of Sao Paulo University School of Medicine.

Results: In this period of the analysis we obtained 18 cases of hepatic artery thrombosis that correspond to 7, 4%, of a total of 243 liver transplantation in this period. Seven cases before 15 days (early arterial thrombosis) and eleven

cases of late arterial thrombosis. In the early group, 4 of 7 cases were women and 3 were men. The MELD score (Model for End-Stage Liver Disease) average was 28.14. The survival rate of retransplantation of this group was 86% in this period. On the other hand, in the late group, among the 11 cases (5 women and 6 men) was six were transplanted, two died and three cases are still waiting transplantation.

Conclusion: Our cases are in agreement with the literature. Early indication of re transplantation had good rate of treatment.

FOS179
EARLY LIVER REGENERATION OF REMNANT LIVER VOLUME AFTER RIGHT HEPATECTOMY FOR LIVING DONATION: A MULTIPLE REGRESSION ANALYSIS

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Introduction: Fifteen years after the first successful right lobe living-donor liver transplant, performed by S.T. Fan, there is still debate over the risks of this procedure and, indeed, over whether it should even be performed. Early liver regeneration was studied in a series of 70 patients who underwent right hepatectomy for living donation from November 2004 to January 2010.

Methods: Liver regeneration was evaluated by multidetector computed tomography at a mean time of 61.07 days after surgery. Age, weight, height, body mass index, liver function tests, creatinine, platelet count, international normalized ratio, glucose, and variables detected with preoperative multidetector computed tomography imaging, including diameter of main portal vein, steatosis, original liver volume and spleen volume, were investigated as potential predictors of liver regeneration. Future remnant liver volume was preoperatively calculated by a virtual surgical cut. Liver function tests and creatinine on the 30th postoperative day and complications occurring within 90 days of surgery and codified within the Clavien classification were analyzed.

Results: Hepatic regeneration of 100% or more at two months occurred in 26 of the 70 patients (37.14%). There was no association between the clinical outcome and the liver regeneration rate. Stepwise multiple regression analysis showed that higher body mass index: (0.035; $P < 0.0001$), preoperative parameters such as smaller future remnant liver volume (0.002; $P < 0.0001$), and greater spleen volume/future remnant liver volume ratio (1.196; $P < 0.0001$) were predictors of greater liver regeneration.

Conclusion: we found approximately 63% of our patients had less than 100% regeneration of FRLV at 60 days: It may be that a rigorous and comprehensive selection protocol can positively influence the regenerative process of the remnant liver after right hepatectomy for living donation, though descriptive reviews of the literature are needed before any association can be made.

FOS180
EARLY RE-OPERATION FOR BLEEDING AFTER LIVER TRANSPLANTATION HAS A SEVERE PROGNOSTIC IMPACT ON PROGNOSIS IN THE MODERN ERA

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Introduction: Bleeding remains a common complication in the early period following liver transplantation (LT). The objective of the study was to analyse the impact early re-operation for bleeding after LT on short term course and long term patient and graft survival.

Methods: 372 consecutive LT performed at our centre since 2005 were analysed. Patients who needed re-operation for bleeding within 30 days of LT (Reopgroup, n = 25 (7%)) where compared to patients without this event (NonReopgroup, n = 347). Only complications graded III to V according to Clavien classification were considered.

Results: The origin of haemorrhage was a vascular anastomosis (44%), nonspecific intrabdominal bleeding (36%), rupture of subscapsular liver hematoma (12%) and abdominal wall bleeding (8%). Postoperative mortality was significantly higher in Reopgroup (17% vs 5%, $p = 0.02$). Postoperative morbidity was significantly increased in Reopgroup (64% vs 27%, $p = 0.0001$). Arterial complications were significantly more frequent in Reopgroup (44% vs 15%, $p = 0.001$). The rate of retransplantation in Reopgroup was also significantly increased (28% vs 5%, $p = 0.0001$).

At 1 year, graft survival rate (41% vs 85% respectively, $p = 0.0001$) and patient survival rate (67% vs 89%, $p = 0.02$ respectively) were significantly lower in the Reopgroup compared to the NonReopgroup.

Conclusion: Re-operation for bleeding following LT impacts negatively on overall morbidity, patient and graft survival. The identification of independent predictive factors of this event is needed to minimize its incidence.

FOS181

LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA: IS PERIOPERATIVE BLOOD TRANSFUSION A RISK FACTOR?

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Introduction: Perioperative blood transfusion was demonstrated as an adverse factor influencing morbidity and mortality following hepatic resection and influencing the overall survival in cases of malignant disease. The aim of this study was to analyze the correlation between blood transfusion and outcomes after liver transplantation (LT) for Hepatocellular Carcinoma (HCC).

Methods: Between 1997 and 2009, 211 adult patients within UCSF criteria who underwent whole orthotopic LT from cadaveric heart-beating donors were retrospectively analyzed. Independent variables were the donor age, cold ischemia time (CIT), receiver age and the transfusion of blood products (packed red cells, fresh frozen plasma, and platelets). Dependent variables were overall survival, mortality, morbidity and specific complications. The Kaplan-Meyer method with the Log-Rank test was used for survival analysis. The Spearman's test, Mann-Whitney U test and Chi-square test were also used.

Results: The number of transfused patient was 168 (64.9%): 137 with Packed Red Cells (PRC), 133 with Fresh frozen plasma (FFP), and 98 with platelets. Overall 1, 3 and 5 year survival was 84%, 75% and 65% respectively. Blood products transfusion was not significantly correlated with the overall survival (5-year survival rate: 65% vs 64%; $p = 0.56$). The number of PRC transfused units was statistically correlated with the mortality rate (median 6 vs 2, $p = 0.002$), primary graft non function (median 13.5 vs 3, $p = 0.005$), and hemorrhagic complications (median 5 vs 2.5, $p = 0.01$). A prolonged CIT (>600 min) was correlated with a higher number of transfused units of PRC and FFP. Accordingly the transfusion of 1 or more units of PRC was correlated with a prolonged ICU stay ($rs = 0.38$; $p < 0.001$).

Conclusion: Even though a difference in survival in HCC patients undergoing LT was not demonstrated regarding transfusion with blood products, the transfusion of PRC seems to be associated with several adverse effects that mostly occur on the early postoperative period.

FOS182

THE CHANGES THAT TOOK PLACE TO SEEK SURGICALLY SAFE AND FEASIBLE RENOPORTAL ANASTOMOSIS IN LDLT

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Introduction: When recipients have obliterated portal vein and big splenorenal shunts, renoportal bypass is performed for portal inflow reconstruction. Kato first reported end-to-end (E-to-E) renoportal anastomosis (RPA) by using left renal vein (LRV) and interposition of cadaveric iliac vein. In LDLT, Osaka group used E-to-E RPA but interposed autogenous internal jugular vein, which might have possibilities of cosmetic or neurologic complications. At our institution, however, more safe and feasible methods have been sought after bitter experience of E-to-E RPA. Based on the largest experiences of RPA in LDLTs, we would like to present better approaches by introduction of the whole changes that took place in RPA.

Methods: RPA has been performed in 8 patients among 1621 adult LDLTs from October 2005 to October 2011. We reported side-to-end (S-to-E) RPA without division of LRV was easy and secure method under better operation field. Cadaveric fresh vessel grafts were used for interposition. However, scarcity of organ donation in Korea hindered timely LDLT for recipients requiring RPA. To overcome shortage of fresh vessel graft, we first reported ringed polytetrafluoroethylene (PTFE) graft for RPA. Recently we found E-to-E RPA is also surgically safe and feasible method if we perform additional dissection around inferior vena cava (IVC) and use IVC cuff of LRV for E-to-E RPA.

Results: S-to-E RPA was performed in 6 patients and all patients except 1 dead patient related to brain hemorrhage were alive. E-to-E RPA was performed in 2 patients and alive. The first E-to-E RPA were performed during early period, but stenosis developed on posttransplant 1 day because of thin LRV wall and poor operation field after division of LRV. However, the second E-to-E RPA was performed recently without difficulty because IVC cuff of LRV had thick wall and large opening. As an interposition graft, cadaveric fresh vessel graft was used for initial 5 patients. Thereafter, artificial vascular grafts including PTFE and Dacron have been used without complication in remaining 3 patients.

Conclusion: As we describes above, if RPA is performed considering the safety and feasibility, the type of RPA or interposition graft is no longer issue.

FOS183

PRIMARY RESULTS OF SALVAGE LIVER TRANSPLANTATION IN THE PATIENTS WITH UNRESECTABLE RECURRENT HEPATOCELLULAR CARCINOMA AFTER INITIAL LIVER RESECTION

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Introduction: Studies have indicated that salvage liver transplantation (SLT) is a choice of treatment for recurrent HCC fulfilling the Milan criteria. However, there is no consensus on the value of SLT in patients with recurrent

HCC beyond the Milan criteria, especially in those with unresectable HCC.

Methods: Eleven patients with recurrent HCC underwent SLT in Tongji Hospital between January 2003 and July 2010. All the 11 patients were with recurrent HCC that was unresectable because of deteriorated liver function in two cases, multiple bilobar tumors and/or vascular invasion in nine cases. Three of the 11 patients fulfilled the the Milan criteria, and other eight patients were beyond the Milan criteria. The outcomes and prognostic factors of these patients were analyzed.

Results: The mortality of this cohort was zero. At a median follow up of 30 months, six patients were alive, including all three patients fulfilling the Milan Criteria. Four patients died from HCC recurrence at 8, 14, 16, and 18 months, respectively, and one died from gastric cancer without HCC recurrence. The 1-, 2-, and 3-year recurrence rates after SLT were 58.4%, 72.3% and 86.1%, respectively. The 1-, 2-, and 3-year overall survival rates were 90.9%, 40.6% and 40.6%, respectively. Vascular invasion, recurrent HCC beyond the Milan criteria and early recurrence within 18 months after initial resection are negative prognostic factors of SLT in patients with unresectable recurrent HCC.

Conclusion: SLT can be recommended as an alternative treatment for the patients with recurrent HCC fulfilling the Milan criteria. For those recurrent patients beyond the Milan criteria and those with vascular invasion or early recurrence after initial resection, however, SLT is not beneficial and should not be recommended.

FOS184
FEASIBILITY OF LIVER TRANSPLANTATION (LT) WITH PRESERVATION OF THE INFERIOR VENA CAVA (IVC) AND WITHOUT VENO-VENOUS BYPASS USE (VVB) IN ADULT POLYCYSTIC LIVER DISEASE (PLD)

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Introduction: Massive handicapping hepatomegaly due to PLD is accepted as indication for LT. In the early series, outcome was poor because of high morbidity and/or mortality related to technical difficulties of the hepatectomy. We reviewed our surgical experience performing a hepatectomy with IVC preservation and without the use of VVB and long term outcome.

Methods: Between 1999 and 2010, 21 patients underwent LT for PLD. The median age was 50 years (range, 28–68). 5 patients with isolated PLD (no renal disease) received LT alone. 7 of the 21 patients (33%) had previous extensive surgical fenestrations of the liver cysts. Of 16 patients with combined PLD and Autosomal Dominant Polycystic Kidney Disease, 13 underwent isolated LT and 3 received a combined liver and kidney transplantation. Tacrolimus monotherapy and triple immunosuppressive regimen (tacrolimus, mycophenolate mofetil and steroids) were given respectively after isolated LT and combined liver and kidney transplantation. The median follow up was 61 months (range, 17–147).

Results: IVC sparing hepatectomy without the use of VVB could be realized uncomplicated in all patients. In patients with previous liver surgery, hepatectomy was much more difficult and surgical time was significantly longer ($p = 0.032$). However, total blood transfusion and transfusion of Stable Solution of Plasma Protein were comparable between the 2 groups ($p = 0.952$ and $p = 0.627$). The allograft was routinely implanted using a large latero-lateral cavoplasty during partial IVC clamping. The 1 and 5-year patient and graft survival were 100% and 100% and 95% and 90%, respectively. Hepatic artery thrombosis and diffuse (ischemic type) intrahepatic biliary strictures were the causes of graft failure, respectively 3 days and 42 months after LT.

Conclusion: LT for PLD can only be justified if transplant surgery can be done without major morbidity and no mortality and if long-term outcome is excellent. Our experience in a small patient cohort confirms that LT technique based on surgical anatomy and anatomical surgery allows to obtain excellent results. Previous liver cyst surgery is usually unsuccessful at long term and it also seriously compromises the transplant procedure.

FOS185
ABERRANT PORTAL VENOUS ANATOMY IN RIGHT LOBE LIVING RELATED LIVER TRANSPLANTATION: MANAGEMENT STRATEGIES AND COMPARING OUTCOMES

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Introduction: Scarcity of organ grafts has paved the way for accepting liver donors with anatomical anomalies once considered a contraindication for living related liver transplantation. Anomalous portal venous anatomy is one such technical challenge which has been overcome with developing expertise. Whether this anatomical anomaly effects the results of transplantation is an unanswered question. There is no consensus in literature regarding the ideal technique to deal with this complex anatomical challenge.

Methods: To analyse our results of right lobe living related liver transplantation associated with anomalous portal venous anatomy and to propose a algorithm for management of this spectrum of anatomical variations. Also to compare the results of transplantation in this setting vs. standard portal venous anatomy we assessed the outcome of 576 patients who underwent right lobe LDLT from January 2007 to September 2011 with respect to the reconstruction of double-graft Portal veins.

Results: In 576 right lobe liver recipients 4.3% (n = 25) received a graft with dual portal veins. Portal veins were unified prior to implantation either by a venoplasty, or using a portal vein "Y" graft from the explanted liver. Unison venoplasty was the preferred technique used in 76% (n = 19) cases. Portal vein "Y" graft was used for unification in n = 6 cases. The indications for using a Y graft unification were: a – the distance between the sectroral portal veins was >6 mm: b – the sectroral veins had a parallel course relative

to each other. Portal vein complications occurred in 1 patient in the dual PV group vs. 2 in the single portal vein group (p = ns) over a follow up of 26 months. Graft survival was 83.2% in single PV grafts vs. 86.6% with dual PV (p = ns). **Conclusion:** Although a technical challenge, dual portal vein right lobe grafts can be safely utilized for living related liver transplantation. The technique for implantation needs to be adapted to the anatomical scenario, the results of transplantation with dual portal vein grafts is comparable to those with standard PV anatomy.

FOS186
LEFT LOBES PROVIDE IMPROVED DONOR SAFETY IN LDLT WITH EXCELLENT OUTCOMES BUT HIGHER RISKS IN THE RECIPIENTS

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Introduction: Live donation using a portion of the donor's liver has been limited primarily by concerns about the donor risk. Although death and liver failure requiring transplantation occur in donors, we believe that it is important to understand the risks of hepatectomy shy of these consequences. We report the largest North American experience with left lobe grafts.

Methods: We restricted our analysis to LDLT in MELD era (2002-on). These included 92 RL grafts, 25 full LL grafts and 33 LLS grafts. We reviewed recipient demographics including age, weight, height, primary diagnosis, MELD, portal flow modulation. We analyzed donor outcomes with regard to peak T Bil, INR, AST, Length of stay, Platelet counts and complications. We analyzed recipient graft and patient survival, biliary and vascular complications, re-admissions and Length of stay.

Graft selection: Volumetric analysis of the donor liver was performed starting in 2002. If graft/recipient weight ratio was >0.6, left lobe grafts were considered. Left lobe grafts were the preferred graft if both right and left lobe grafts were thought to be feasible.

Results: RL were 830 grams on average and LL were 507 grams. GRWR was 1.12 for RL and 0.81 for LL. Donor outcomes were markedly different. The short term function of the liver remnant was markedly better in the LL donors with INR and T bil significantly different from RL donors. Incidence of T bil > 5 and INR > 2 was 13 and 17% in RL and 0% in LL donors. Donor LOS was significantly shorter with left lobe donors. Recipient patient survival was not significantly different. Recipients experienced an increased length of stay with left lobe grafts 13 for RL vs 18.5 for LL. Biliary complications were high in each lobe graft but leaks were more common in right lobe grafts (55% of biliary complications) versus 25% of left lobe grafts.

Conclusion: Liver transplantation is an excellent therapy for patients with end-stage liver disease. Survival after liver transplantation is markedly improved for patients with decompensated cirrhosis. The introduction of the MELD allocation has reduced pre-transplant waitlist mortality. Left lobe grafts should be the primary choice in living donor liver transplantation. The lower limits of graft size that leads to an acceptable outcome in the recipients remains to be determined.

FOS187
COMPLICATIONS IN DONORS AFTER LIVING DONATION FOR LIVER TRANSPLANTATION IN ALGERIA

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Introduction: In the absence of cadaveric grafts, an adult living donor liver transplant (LTLD) program was started in Algeria in 2003. The aim of this study is to evaluate donor's complications after hepatectomy in LDLT.

Methods: We retrospectively analyzed the outcomes of 33 patients who underwent live donor hepatectomy for adult living donor related liver transplantation between February 2003 and December 2011. Right hepatectomy was performed in 31 patients, left hepatectomy in 1 patient and in 1 case the procedure was aborted. The complications were stratified according to Clavien's system. In this study, grade I and II were considered minor complications and grade III and IV major complications.

Results: All donors survived the procedure. They were 18 females and 15 males, with a mean age of 26 years (18 to 58 years). The mean hospital stay was 19 days (11 to 33 days) and the follow-up ranged from 13 months to 106 months. In the immediate postoperative period, 26 complications were recognized in 16 donors (49%). Complications were scored as grade I in 6 cases (23%), grade II in 13 cases (50%), grade IIIa in 3 cases (11.5%), grade IIIb in 3 cases (11.5%) and grade IV in 1 case (4%). They were minor in 19 cases (73%) and major in 7 cases (27%). These major complications were encountered in 5 donors (16%). The 33 donors are alive without any late complications.

Conclusion: In our experience, hepatectomy in live donor liver transplantation was associated with significant complications. Although most complications were low-grade severity, a significant proportion were severe or life threatening. It is for what, it is important to develop a cadaveric liver transplant program.

FOS188
CHOLEDOCHODUODENOSTOMY IS AN EXCELLENT ALTERNATIVE TO ROUX Y CHOLEDOCHOJEJUNOSTOMY

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Introduction: Choledochoduodenostomy (CDD) is an alternative to Roux Y choledochojejunostomy (CDJ) for biliary reconstruction during liver transplantation. Potential advantages include avoidance of a jejunojejunostomy, decreased operative time, and ease of endoscopic intervention after transplantation. We reviewed our experience with specific aims to compare safety and postoperative course with CDD versus CDJ.

Methods: Eighteen CDD biliary reconstructions were performed in patients undergoing whole organ deceased donor liver transplantation at our institution between 2005 and 2011. Forty-five control patients underwent CDJ during the same time period. We excluded retransplants and patients with cholangiocarcinoma. We reviewed hospitalization duration, postoperative complications, and survival data. Comparisons were made with the Student t-test for binary/percentage outcomes and with the Mann-Whitney U test for non-parametric/median outcomes.

Results: There were no differences in one year patient or graft survival between the two groups. There was also no difference in median duration of hospitalization. Complications requiring intervention were significantly more common after CDJ than CDD. Biliary leaks, biliary stenoses, and bowel complications were found in 20.0% of CDJ patients, compared with 0.0% for CDD patients ($p = 0.04$). Median operative time was significantly longer for CDJ than CDD. Absence of complications in the CDD group precluded comparison of endoscopic intervention.

Conclusion: CDD is an effective and safe technique for biliary reconstruction. Safety compares favorably to that of CDJ. CDD is associated with shorter operative time and fewer complications than CDJ. With additional experience, CDD should also prove to be more amenable to endoscopic intervention than CDJ.

FOS189
SYSTEMATIC CT-SCAN ON POST-OPERATIVE DAY 7 AFTER LIVER TRANSPLANTATION DECREASES THE RATE OF RETRANSPLANTATION FOR ARTERIAL COMPLICATIONS

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Introduction: Arterial thrombosis is a main cause of graft lost after liver transplant (LT). Objective of this study was to assess the incidence of systematic CT-scan on post-operative day (POD) 7 on the rate of retransplantation (ReLT).

Methods: 232 consecutives pts transplanted in 1997–1999 (1st period) were compared to 250 pts transplanted in 2008–2010 (2nd period) in the same center. A clinical, biological and echodoppler control was daily performed from POD1 to POD7. An injected CT-Scan was realized only in case of abnormalities in 1st period and systematically on POD7 in 2nd period. Graft and donor features, risk factors of arterial thrombosis (AT), incidence of arterial stenosis (AS) or AT, their treatments and consequences in the 1st year after LT were compared in the two groups. Groups (1st vs 2nd period) were different for donors' ages and body mass index (age: 41 ± 1 yr vs 52 ± 1 yr; $p = 0.0001$ – BMI: 23 ± 4 vs 25 ± 5; $p = 0.0001$) and recipients' ages (46 ± 1 yr vs 50 ± 1 yr; $p = 0.0004$).

Results: In the 2nd period, incidence of AS was significantly higher (1/232 (0.4%) vs 11/250 (4%); $p = 0.006$), incidence of AT at 1 year was lower but not significantly (11/232 (4.7%) vs 5/250 (2%); $p = 0.2$). Systematic POD7 injected CT-scan had significantly increased the radiological diagnosis of AS and/or AT (1st vs 2nd period): 7/12 (58%) vs 15/16 (94%); $p = 0.05$ and decreased its diagnosis delay (3 ± 2.5 months vs 1.1 ± 0.3 months). In the 1st period, AS or AT treatments had been reLT (n = 5), arterial reconstruction (n = 3), stent (n = 1) or anticoagulation (n = 3). In the 2nd period, treatments had been reLT (n = 1), arterial reconstruction (n = 4), stent (n = 3) or anticoagulation (n = 8).

Conclusion: After AS and/or AT, the rate of 1st year reLT was 5/12 (42%) in 1st period vs 1/16 (6%) in the 2nd period; $p = 0.04$ and 1st year mortality was 1/12 (8%) vs 0/16 (0%); $p = 0.5$.

A systematic injected CT-scan on post-operative day 7 after LT decreased the rate of reLT for arterial thrombosis by improving early detection and treatment of arterial abnormalities.

FOS190
SURGICAL ANATOMY OF HEPATIC ARTERIAL SYSTEM: IMPLICATIONS IN LIVER TRANSPLANTATION AND LIVER SURGERY

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Introduction: An intact hepatic artery is the gateway to successful hepatobiliary surgery. Division or damage with subsequent thrombosis produces ischemia of liver or bile duct which can have devastating consequences.

Most of the studies have focused on replaced or accessory arterial branches but without much information regarding segmental branching of right and left hepatic artery, which are important for right or left liver harvesting.

Methods: Dissections was performed on 50 liver specimens which were removed enbloc with abdominal aorta during postmortem examination. Liver were dissected under the magnascope with lens magnification of 2.5X in the Department of Anatomy, PGIMER, Chandigarh. Hepatic

artery was dissected from its origin. The extra and intra hepatic arterial anatomy was studied. Anatomic variations were recorded & classified for its application to LDLT & SLT. The observations were photographed with a digital camera (DSC-W 90, Cyber shot 8.1 Megapixel, Sony, Japan) and schematic diagrams of the arteries were made.

Results: Hepatic artery was classified according to Michels classification. Five types of Michels patterns were observed. Variations that could not be included in the Michels classification was observed in 17% of livers.

Segmental pattern of right hepatic artery (RHA) was classified into 4 types as per classification proposed by Arnold Rathke.

I – Conventional
II – Linear arrangement
III – Early segmental branch
IV – Crossover transposition

Authors proposed a classification on left hepatic artery (LHA) into three types based upon its origin and segmental pattern.

A – Conventional origin and segmental pattern
B – Normal origin and variant segmental pattern – 3 subtypes
C – Variant origin and segmental pattern – 4 subtypes

Conclusion: Hepatic vascular anatomy is essential while evaluating donors and recipients during living adult liver transplantation programs. But their importance in surgical planning of adult LDLT has not been described systematically. Preoperative evaluation plays a crucial role in surgical planning and has been shown to minimize mortality and morbidity.

FOS191
EARLY DEVELOPMENT OF POST TRANSPLANT METABOLIC SYNDROME: TIME FOR BARIATRIC SURGERY?

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Introduction: Post Transplant Metabolic Syndrome (PTMS) includes metabolic manifestations of obesity. Its prevalence increases in the liver transplant population, impacting post operative course and survival. The objectives of this study are to estimate the incidence of PTMS and determinate risk factors of PTMS development.

Methods: Between June 2005 and December 2010, 128 patients underwent liver transplantation. Non inclusion criterion was death within 3 months after Liver Transplantation (LT). A cohort of 97 (75.8%) patients was followed for at least 2 years (mean age 52 ± 10 years, 77.3% men). Indication for LT was hepatitis C virus infection in 43.3%, alcohol in 42.3%, auto-immune hepatitis in 5.1%, fulminant liver failure in 5.1% and other in 11.3%. Metabolic syndrome was diagnosed according to the worldwide definition of the International Diabetes Federation.

Results: There was no impact of PTMS on mortality rates (13% vs 18%, p = 0.578). The incidence of PTMS increased from 17.5% before LT to 40% at 1 year and 56% at 2 years. Recipients with PTMS experienced more post surgical infections (30% vs 11%, p = 0.028). The cardiovascular events were comparable for patients with or without PTMS (22% vs 9%, p = 0.100). Creatinine clearance was significantly decreased at 1 year in the group of patients with PTMS (68 mL/mn vs 80 mL/mn, p = 0.016) and comparable at 2 years (72.2 mL/mn vs 72 mL/mn, p = 0.965). Severe renal insufficiency rates (estimation using Modification of the Diet in Renal Disease) were not significantly different between the two groups (19% vs 7%, p = 0.133).

Conclusion: Significant predictive factors for PTMS on logistic regression analysis were age >60 years at transplant (Odds Ratio [OR] = 6.14 IC95% [1.37; 27.53]), alcoholic cirrhosis (OR = 3.53 IC95% [1.02; 12.24]), pre transplant diabetes (OR = 3.94 IC95% [1.19; 13.00]), pre transplant hypertension (OR = 6.88 IC95% [1.22; 38.80]). PTMS is present in 56% of recipients at 2 years after LT. Predictive factors for PTMS could be applied to select candidates for bariatric surgery to improve long term outcomes.

FOS192
ACTUAL LONG-TERM RISK OF HEPATOCELLULAR CARCINOMA RECURRENCE AFTER LIVING DONOR LIVER TRANSPLANTATION AND LOGISTIC SCREENING PROTOCOL

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Introduction: This study intended to establish an actual risk-based long-term screening protocol for hepatocellular carcinoma (HCC) recurrence after liver transplantation (LT).

Methods: The study population were 334 HCC patients who underwent primary living-donor LT with follow-up period for more than 5 years. Their medical records were reviewed retrospectively. Overall 10-year survival rate was 67.5% with 4.8% perioperative mortality. HCC recurred in 68 (21.4%) of 318 survived patients during a mean follow-up period of 77 months. Cumulative HCC recurrence rate was 20.7% at 5 years and 22.2% at 10 years. Annual recurrence rate was 11.4%, 6.6% and 2.0% during first, second and third years, respectively.

Results: In within-Milan group, annual incidence of HCC recurrence was higher during first 3 years, and thereafter only 6 cases of sporadic recurrence happened over 11 years; in beyond-Milan group, recurrence was very common during first 3 years, but no more after 3 years. AFP (alpha-fetoprotein) rise became an initial clue to perform further imaging study to diagnose recurrence in 43 (63.2%), whereas recurrence was detected incidentally on routine imaging study in other 25 (36.8%) showing no AFP rise. Initial sites of HCC recurrence were graft liver in 26, lung in 16, abdominal cavity in 10, bone in 6, brain in 1, and multiple metastasis in 6. Median post-recurrence survival period was 10 months with 3-year survival rate of 13.2%.

Conclusion: In conclusion, annual risk of posttransplant HCC recurrence was significantly different depending on Milan criteria. There was a close correlation between pre-transplant AFP level and AFP rise after HCC recurrence.

Patients beyond Milan criteria is indicated for frequent follow-up with tumor marker tests and imaging studies for first 3 years, and those within Milan criteria is recommended to follow up for 10 years, primarily with tumor marker tests.

FOS193
EVALUATION OF 57 CASES SYNTHETIC VASCULAR GRAFTS IN RECONSTRUCTION OF MIDDLE HEPATIC VEIN BRANCHES IN RT LOBE LIVING DONOR LIVER TRANSPLANTATION

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Introduction: Venous outflow reconstruction of segment V and VIII venous branches using synthetic vascular grafts is a controversial issue with various techniques. Optimum venous outflow is essential for graft survival.

Methods: Between 2004 to 2011, 157 cases of living donor liver transplant were done in GEC mansoura, males 146 females 12. Synthetic grafts were used in 57 cases, Age 49.5 + 7.7. Post HCV cirrhosis 25, HCC 22 and other indication in 3 cases. Synthetic graft to V alone in 29 cases (single in 28 and double in one case), VIII alone in 12 cases and combined V and VIII in 12 cases.(one graft conduit in 6 cases, double graft in 7 cases and combined natural and synthetic in one case) Synthetic vascular grafts are used in the back table to segment V or VIII veins or both, then to either MHV stump or IVC of recipient after revascularization. Patency is judged by intraoperative and postoperative Doppler and function of the graft. Ct is done only if there is doubt.

Results: Post operative Doppler shew edema in segment V or VIII or both in 17% of single RT hepatic vein anastomosis, progress to graft infarction in 2 cases. Intraoperative thrombosis of synthetic graft was documented by Doppler in 11 cases and redo with wash of thrombus was successful in 9 cases. Excellant flow was found in 42 cases. Bad flow and no flow was seen in 2 cases and with bleeding and closure of graft was done. Salvage grafts were inserted in 3 cases (V in 2 and VIII in one) as intraoperative Doppler show segment congestion with wide vein inside the Liver (ligated during donor hepatectomy). Warm ischemia time was 45.4 min + 18.5 min (no difference to single anastomosis). Postoperative Doppler show obstructed flow in 6. Others patent up to 2 years.

Conclusion: Synthetic grafts are good alternative to native grafts with good patency and avoids long warm ischemia time. It is safe and can be done on backtable for any number of veins.

FOS194
SWINE MODEL OF LIVER AUTOTRANSPLANTATION WITHOUT VENOUS BYPASS

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Introduction: Liver transplantation in swine has improved surgical technique education and research development. Most surgical techniques are conventional liver transplantation using 1 donor and 1 recipient swine. Aiming to improve the technical training of liver transplantation surgeons, minimizing the number of animals used and the research cost, we describe an experimental model of liver auto-transplantation in swine without venous bypass.

Methods: The surgery starts with a "J" incision. The dissection of the hepatic hilar structures obey the steps of human conventional liver transplantation. Supraceliac aorta is dissected behind the left diaphragmatic crus. Conventional total hepatectomy is performed after supraceliac aorta clamping. The clamping sequence is: supraceliac aorta, portal, infrahepatic and suprahepatic inferior vena cava (IVC). The auto implant is performed by suprahepatic, infrahepatic IVC and portal end-to-end running anastomosis, using polypropylene 4.0, 5.0 and 6.0, respectively. Then, the supraceliac aorta clamp is removed and the liver revascularization. Arterial anastomosis is performed using polypropylene 7.0 and biliary anastomosis using polypropylene 6.0.

Results: Surgery is performed in an average time of 237 minutes (min). The average time of hepatectomy is 104.6 min. Suprahepatic inferior vena cava (IVC), infrahepatic IVC and portal anastomosis are performed in an average time of 20 min, 7.33 min and 14 min, respectively. Arterial and biliary anastomosis, are done in an average time of 14.66 min and 18 min, respectively. The urine output average volume is 2.6 mL/Kg/h. The bleeding average volume is 367 mL.

Conclusion: The liver auto-transplantation in swine without venous bypass is a feasible procedure for surgeons practice. It is also a less expensive model, excellent as an experimental model for research.

FOS195
SUM OF HCC NODULES AT EXPLANT: A MAIN RISK FACTOR FOR HCC RECURRENCE AFTER LIVER TRANSPLANTATION

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Introduction: The aim of this study is to evaluate risk factors and rate of HCC recurrence in patients submitted to liver transplantation (LT).

Methods: Medical records of transplanted patients between 2002–2007, at our center, were retrospectively analyzed.

During this period, 231 LTs were performed and 33 patients (14.2%) had HCC. Preoperative patient and tumor characteristics, pathologic data and rates of tumor recurrence were collected.

Results: Of the 33 HCC transplanted patients, 24 (72%) were men and median age was 55 years (26–65). Etiology of cirrhosis was HCV in 67%. At HCC diagnosis, 20 patients were Child-Pugh A. All but 2 cases had tumors within the Milan Criteria on the basis of radiology. Most patients had uninodular HCC (75%) and median tumor burden was 25 mm (13–70). During the waiting list period, PEI/RF, TACE and combined therapy were used in 10, 13 and 5 patients, respectively. At explant analysis, tumor was moderately differentiated in the majority of cases (85%). Number of nodules was 1, 2, 3 and multinodular in 11 (33%), 8 (24%), 6 (18%) and 8 (24%) patients, respectively. Median HCC size was 27.5 mm. In 24 patients that survived beyond the immediate post-transplant period, mean follow-up was 33 m (8–51). Recurrence occurred in 5/24 cases (21%), at a mean time of 27 m (21–35). Liver (n = 1), bone (n = 2), nodes (n = 1) and peritoneal (n = 1) were the sites of recurrence. Comparing explant analysis of patients with and without recurrence, there was no difference in tumor size (3.9 versus 3.2, ns) or satellite nodules detection (40% versus 25%, ns). Number of nodules was higher in patients with recurrence (3.8 versus 2.2, p = 0.05). In patients with recurrence, microvascular invasion was observed in 60% (versus 18%, p = 0.07). The sum of largest diameter of all nodules at liver explant was higher in patients with recurrence and this difference was statistically significant (8.5 cm versus 4.5 cm, p = 0.01).

Conclusion: HCC recurrence after liver transplantation occurred in 21%, at a mean time of 27 m. Sum of largest diameter of all nodules at explant analysis was the main risk factor for HCC recurrence in our center.

FOS196
OUTCOME OF LIVER TRANSPLANTATION PATIENTS INFECTED WITH GRAM-NEGATIVE BACTERIA: NON *ACINETOBACTER BAUMANNII* AND *ACINETOBACTER BAUMANNII*

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Introduction: The incidence of infection after liver transplantation is the highest within the first month, and the Gram-negative bacteria is the major pathogens. Such infection may further progress into severe sepsis and even mortality. The purpose of this study is to explore Gram-negative bacterial infection in *Acinetobacter baumannii* and non-*Acinetobacter baumannii* groups, to investigate the risk factors of infection and the possible complications, so as to provide a suggestion for infection elimination.

Methods: A consecutive 103 patients receiving liver transplantation in our center (orthotopic liver transplantation, n = 37, and living donor of liver transplantation, n = 66) were enrolled into this prospective study. Those who were infected with Gram-positive microorganism and fungus were excluded. The risk factors are classified into pre-operational factors and post-operational ones. The influences on the infection incidence and mortality rates by these factors were analyzed.

Results: A total of 89 liver transplantation patients were enrolled into the study, of which 59 patients were free from infection and 30 patients had Gram-negative infection. The infected patients were subgrouped into non-*A. baumannii* and *A. baumannii* groups, 15 for each group. The infected group had significantly longer ICU stays and total hospital stays. The percentage of post-operative hemodialysis and secondary operation were also of statistical significance between infected and non-infected group ($P < 0.001$). Infection was also found to be correlated with higher hospital mortality ($P = 0.001$), lower overall survival rate ($P = 0.027$), and worse pre-operation MELD score ($P = 0.049$).

Conclusion: The study showed that hemodialysis after the operation and secondary operation may increase the risks of postoperative Gram-negative bacteremia, which elongate the ICU and hospital stay. It is also correlated to the worse mortality rate and overall survival. The one-year survival rate of *A. baumannii* infected group is lesser than that of the non-*A. baumannii* infected group. Therefore, early elimination of *A. baumannii* when they are first cultivated is suggested.

FOS197
EXTRACORPOREAL MEMBRANOUS OXYGENATION IN A PORCINE NON-HEART BEATING LIVER MODEL OF ORGAN PRESERVATION – A TOOL FOR IMPROVED HEPATOCYTE ISOLATION

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Introduction: The aim of organ preservation is to maintain cellular viability and organ function. Non-heart-beating donor (NHBD) livers represent a potential pool of organs that could significantly supply and meet the demand for liver transplantation. To determine whether ECMO affects the viability of hepatocytes, we have used a porcine model of human organ donation and compared the viability and culture of hepatocytes isolated from pigs which have undergone ischaemia typical in NHBD tissue with cold perfusion.

Methods: Female pigs were anaesthetised with propofol and alfentanyl and killed by a KCl injection followed by 30 minutes of warm ischemia. Pigs were then subjected to either in situ intra-vascular cooling with HTK buffer and intra-peritoneal cooling for 2 hours (n = 5) or in situ ECMO at 37°C for 2 hours (n = 7). Livers were retrieved from both groups and were subjected to back table flush with HTK and then placed on a re-perfusion circuit with normo-thermic oxygenation for 2 hours. Hepatocytes were isolated by a two step collagenase perfusion/digestion and cultured. Hepatocyte viability was assessed by trypan blue dye exclusion, culture seeding efficiency and MTT reduction.

Results: The viability of hepatocytes was significantly better in ECMO group compared to the cooling group (mean

96.6% vs 90.6%). ECMO isolated hepatocytes had significantly better viability ($p < 0.05$) when evaluated with trypan blue. Hepatocytes were then cultured for 14–16 hrs at 37°C and tested for viability using the MTT assay. The ECMO group had superior mitochondrial function compared to the cooling group ($p < 0.05$ mean 0.65 vs 1.21) in addition to better seeding efficiency (77.8% versus 39%). Glycogen content was significantly higher in the cooling group both before ($p < 0.021$) and after $p < 0.008$) reperfusion when compared to ECMO. Similarly GSH was significantly preserved in the cooling group.

Conclusion: This pre-clinical study suggests that ECMO is a viable technique for liver preservation that leads to an excellent yield of hepatocytes when isolated from an uncontrolled NHBD. It is also technically easier to institute and more efficient than other methods of oxygenation.

FOS198
ORTHOTOPIC LIVER TRANSPLANTATION USING SELECTED ADVANCED AGE DONORS SHOULD BECOME THE ROUTINE

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Introduction: Orthotopic liver transplantation (OLT) from advanced age donors have been shown to provide acceptable results in short series. However, early synthetic function and outcome of these grafts has not been studied in large cohort.

Methods: Since 2004, from a prospectively maintained registry of 771 OLT, 81 OLTs from selected (no cardiac arrest or moderate/severe steatosis) donors older than 75 years (75 to 91) (ELD; Elderly Donor) were compared to 169 OLTs from donors between 40 and 60 years (UD; Usual Donor), in recipient with similar MELD (17.8 vs 19.5; $p = 0.2$), with a specific attention to early postoperative liver function test, vascular complications, and long-term outcome.

Results: With similar cold ischemia time (459 vs 463 minutes; $p = 0.827$), ELD liver function test and their kinetic were superimposable when compared to UD.

ELD short-term outcome was as good as UD one, without significant difference in PNF (2.5% vs 3.6%; $p = 0.667$), EAD (11% vs 20%; $p = 0.087$), 30-day mortality (2.5% vs 5.6%; $p = 0.238$), or arterial thrombosis (1.2% vs 4.7%; 0.06). Long-term outcome were similar regarding 3-year graft (72.4% vs 70.6%; $p = 0.645$) and patient survival (74.8% vs 72.3%; $p = 0.645$) or retransplant rate (5.1 vs 7.7; $p = 0.445$).

Conclusion: This large single center study confirms that selected advanced age donor had excellent short and long-term outcome. These results should lead us to widely accept these selected grafts, and manage them as usual ones.

FOS199
IMPACT OF SIROLIMUS IN RENAL FUNCTION RECOVERY FOLLOWING LIVER TRANSPLANTATION

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Introduction: Sirolimus is a well recognized immunosuppresive agent with antiproliferative and antifibrotic properties, it's inhibition of mTOR as well as collagen, mRNA procollagen, transglutaminase and its lack of nephrotoxicity are the key factors to consider this agent as a first line option in liver transplant patients who developed adverse effects of anti-calcineurinic drugs such as nephro and neurotoxicity.

Methods: A retrospective analysis was done at Liver Unit of Centro Medico Nacional 20 de Noviembre-ISSSTE at Mexico City.

Patients: Eight liver transplanted patients between 2003 and 2007 who were under and developed nephrotoxicity associated to anti-calcineurinic immunosuppresive treatment.

Pre-transplant diagnosis were Hepatitis C Cirrhosis in 3 cases, Primary Biliary Cirrhosis in 3 cases, Caroli disease in one patient and cryptogenic Cirrhosis in one patient.

We calculated time to progression of renal impairment following liver transplantation, degree of renal impairment according to KDOQI classification, and recovery of renal function after Sirolimus (Rapamune®) treatment was started.

Results: All patients were 46 to 64 years old at the time of transplantation, 87.5% are female.

62.5% of patients were under tacrolimus and 37.5% under cyclosporine.

The mean time of developing nephrotoxicity was 3 years for the tacrolimus group and 6 months for the cyclosporine group.

Cyclosporine group had the major degree of renal impairment (two on stage V and one stage IV).

According to KDOQI classification before Sirolimus they were; Stage III 25%, Stage IV 50% and Stage V 25%, after Sirolimus was started they changed to Stage II 25%, Stage III 37.5%, and Stage IV 37.5%.

All the patients except one who remain in the same stage improve at least one degree or stage. Renal function improvement ranged between 0% to 194%, mean 60% under Sirolimus.

Conclusion: Sirolimus was related to a significant improvement of renal function after nephrotoxicity secondary to anti-calcineurinic treatment.

Sirolimus effect was no different in tacrolimus or cyclosporine group.

There were only minor adverse effects after sirolimus was started such as mild dislipidemia in 50%.

Pancitopenia seen in two patients were not only attributed to sirolimus but also Hepatitis C Virus re-infection.

FOS200

EFFECT OF RAPAMYCIN COMBINED WITH MMF OR CISPLATIN COMBINED WITH RAPAMYCIN AND MMF ON TUMOR CELL GROWTH SUPPRESSION IN 3 TYPES OF HCC CELL LINES

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Introduction: There are reports about anti-tumor effect of rapamycin after liver transplantation for patients with HCC. However, rapamycin only immunosuppression is sometimes not enough in terms of immunosuppression after transplantation. We investigated the anti-tumoric efficiency of rapamycin only immunosuppression and rapamycin combined with other immunosuppressant and finally, rapamycin combined with anti-tumor drug including cisplatin or sorafenib or 5-FU.

Methods: We studied anti-tumoric effects in three HCC cell lines (HepG2, Hep3B, Huh7) after treatment with rapamycin or rapamycin with other immunosuppressants or rapamycin with or without anti-tumor drug such as cisplatin, 5-FU, sorafenib. To elucidate the underlying molecular signaling pathway, we performed Western blotting for phosphorylated p70 S6 kinase protein expression. We used immunosuppressants including rapamycin (5 ng/ml), tacrolimus (5 ng/ml), MMF (500 ng/ml) and anti-tumor drugs including cisplatin (5 uM/L), 5-FU (200 ng/ml), sorafenib (250 uM/L). We performed MTT assay (24 well) after incubation according previously reported protocol.

Results: Immunosuppression with rapamycin combined with MMF inhibited tumor cell growth at the level of 60% comparing to control group in Huh7 cell lines ($p = 0.001484$) and more effective than rapamycin only treatment. Treatment with rapamycin combined with MMF and cisplatin also inhibited tumor cell growth more effectively than immunosuppressant with other anti-tumor drug or anti-tumor drug only treatment in Huh7 cell lines. These results were similar in other cell lines – HepG2 and Hep3B.

Conclusion: Immunosuppression with rapamycin combined with MMF inhibited tumor cell growth at the level of 60% comparing to control group in Huh7 cell lines ($p = 0.001484$) and more effective than rapamycin only treatment. Treatment with rapamycin combined with MMF and cisplatin also inhibited tumor cell growth more effectively than immunosuppressant with other anti-tumor drug or anti-tumor drug only treatment in Huh7 cell lines. These results were similar in other cell lines – HepG2 and Hep3B.

FOS201

PERI-HILAR COLLECTIONS AFTER LIVER TRANSPLANTATION (LT): DIAGNOSTIC, MANAGEMENT AND OUTCOMES

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Introduction: Peri-hilar collections are among the most frequent complications after LT and can be fatal. Three diagnoses should be discussed: biloma, hematoma and ascite. Imagery doesn't always allow a definitive diagnosis. These collections can become infected or promote vascular complications like thrombosis or false aneurysms. Different strategies are performed: surgical, radiologic or endoscopic treatments, monitoring. The aim of this study was to define criteria for optimal management of these patients.

Methods: Using a prospectively maintained database, we identified all patients undergoing LT from 2006 through 2011 who developed a peri-hilar collection in the first 3 months postLT. We reported a cohort study of 89 collections in a series of 303 LT performed. Clinical and laboratory features, imaging criteria, management strategies were collected. The study population was comparable to the population of our transplant center. The mean age was 54 years old, the causes of cirrhosis were alcohol (42%), HCV (22%), HBV (8%), 35% presented HCC. The mean Meld Score was 20. Liver transplantations were performed using piggyback surgical technique. A duct-to-duct biliary anastomosis was constructed in 54 LT (60%); a biliary drainage was used in 33 patients (37%).

Results: The most common presenting features were an asymptomatic cholestasis (42%), fever (15%) and abdominal pain (11%). The average time to diagnosis was 17 days after LT. US and CT-Scan were the initial imaging test for the diagnosis. Se and Sp of the CT-Scan to diagnose a biloma was 80% and 86%. Monitoring was performed for 42 lesions: hematoma, ascite <50 mm or biloma <30 mm without sepsis. Surgical revision was realized in 37 cases when signs of sepsis, lesion >50 mm and suspicion of biloma. Only 4 patients underwent an un-necessary laparotomy. Radiologic treatment was possible when collections were >70 mm. Endoscopic stent was mainly used at the beginning but 2 arterial thrombosis and a false aneurysm associated with a biloma required reLT.

Conclusion: Peri-hilar collections are frequent after LT (30%). Imaging doesn't make always the diagnosis and influences the surgical strategy when biloma was suspected. The length of hospital stay was significantly increased in this population (31 d vs 20 d, $p < 0.005$). A monitoring is possible (1 US/week during 3 M) for lesions <30 mm without vascular complications. To improve this management, it is necessary to refine the radiological diagnosis in order to eliminate a biloma and randomize different treatments.

FOS202
EVALUATION OF STEATOSIS INFLUENCE OVER TRANSPLANT OUTCOME: A QUARTER CENTURY EXPERIENCE AT A SINGLE CENTER

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Introduction: The rational use of liver grafts is being a great concern between transplantation teams. As the steatosis is frequently present in grafts, many researches have been done to study it. Most of them demonstrated that small grade (<30%) of macrosteatosis is safe to transplant and is not advisable to use graft with severe (>60%) macrosteatosis The aim of this study is to evaluate the steatosis influence over transplant in the Paul Brousse hepatobiliar center.

Methods: We performed a retrospective analysis of a prospectively maintained database in a single center. Two thousand seven hundred and six patients (2.706) were transplanted from December 3, 1984 to December 31, 2010. Graft biopsies were available in 98% of the cases. Donor and recipient data and surgical factors were analyzed. The end-points were primary dysfunction, delayed graft function (aspartate aminotransferase level >2.000 and TP < 30%), 3-month, 1-year and 5-year survival. A multivariable analysis and logistic regression were performed to indentify the risk factors associated with the outcome.

Results: The presence of microsteatosis or macrosteatosis at any percentage is a risk factor for graft dysfunction or primary nonfunction (OR: 1.41 and 1.39; P = 0.01 and 0.02 respectively). The 3-month and 1-year graft survival is only affected by macrosteatosis more than 30% (OR: 1.94, P = 0.002 and OR: 1.41, p = 0.02 respectively). According to the grade of macrosteatosis, the 1 year graft survival was 81% for <30% macrosteatosis, 73% for 30–50% macrosteatosis, 67% for 50–60% macrosteatosis, 58% for >60% macrosteatosis; the 5 year graft survival was 67% for <30% macrosteatosis, 66% for 30–50% macrosteatosis, 44% for 50–60% macrosteatosis, 38% for >60% macrosteatosis.

Conclusion: The presence of graft steatosis, even in the macro or micro steatosis presentation does affect the initial graft function and we think would be reasonable to avoid it in severe patients that could not tolerate a prolonged dysfunction time. Macrosteatosis more than 30% does affect the survival. More than 50% macrosteatosis has a greater rate of graft loss and we don't indicate its use.

FOS203
TRANSCYSTIC DRAINAGE REDUCES THE POST-REMOVAL BILIARY COMPLICATIONS IN LIVER TRANSPLANTATION: A MATCHED CASE-CONTROL STUDY

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Introduction: Bile duct (BD) complications continue to be the "Achilles' heel" of liver transplantation (LT) and the utilization of bile duct drainage is still in debate. We describe the results of a less invasive trancystic biliary drainage (TBD) compared to a standard T-tube (TT).

Methods: The transplanted patients, over a period of 5-years with a TBD (TBD-group), were matched 1 : 2 with control patients with a TT (TT-group) according to waiting status lists, recipient age, recipient body mass index (BMI), model for end-stage liver disease (MELD) score, cold ischemic time (CIT), BD diameter and surgical technique. Primary end points were the overall incidence of BD complications, and graft and patient survival. Secondary end points included the complications after the drainage removal.

Results: Of the 248 patients who received transplants 20 (8%) were performed using a TBD. The trancystic (n = 20) and matched control group (n = 40) were comparable considering the above variables. Although the bile duct leakage rates were not significantly different between both groups, the TT group had a significantly higher rate of overall 1-yr BD stenosis (40 vs 10%) (p = 0.036). Three-year patient/graft survival rates were 83.2%/80.1% and 84.4%/84.4% for TT and TBD groups, respectively. The postoperative BD complications, after drainage removal (peritonitis and stenosis), were significantly reduced (p = 0.011) with the use of a TBD.

Conclusion: The use of TBD in liver transplant recipients does not increase the number of BD complications compared to the T-tube. Furthermore, less BD anastomotic stenosis and post removal complications were observed in the TBD group compared to the TT group.

FOS204

LOW PLATELET COUNT AFTER LIVER TRANSPLANTATION PREDICTS POOR SHORT- AND LONG-TERM OUTCOMES

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Introduction: Recent experimental and clinical studies have shown that platelets play a critical role in liver ischemia/reperfusion injury and regeneration. Thrombocytopenia, a frequent and potentially serious condition in liver transplantation recipients, was shown to be associated with postoperative morbidity and mortality after partial hepatectomy. The aim of this study was to evaluate whether postoperative low platelet counts are indicators of short- and long-term outcomes after liver transplantation.

Methods: Between January 2004 and December 2007, 201 consecutive patients who underwent liver transplantation were included in a prospective database. Pre- and daily postoperative platelet counts until postoperative day (POD) 7 were recorded. Uni- and multivariate analyses were performed to assess whether low postoperative platelet counts are risk factors of postoperative complications, graft failure, re-transplantation and graft and patient survival. Significant variables of current prediction models including recipient and donor age, MELD score, previous liver transplantation, life support dependence, and cold ischemia time were included in the analysis.

Results: The median pre-transplantation platelet count was 88 (IQR: 61–135) $\times 10^9$/L. The lowest median platelet count after liver transplantation was 61 (IQR: 41–88) $\times 10^9$/L at POD4. Patients with POD5 platelet count $<60 \times 10^9$/L had higher rate of grade III-V complications unrelated to bleeding (61% vs. 39%, $p < 0.001$), graft primary non function (5% vs. 0%, $p = 0.025$), delayed graft function (18% vs. 5%, $p = 0.006$) and re-transplantation within 3 months (4% vs. 0%, $p = 0.05$). POD5 platelet count was identified as an independent risk factor of grade III-V complications (OR, 2.5 (1–4.8), $p = 0.004$)), graft survival (HR, 2.2 (1.2–4.1), $p = 0.017$)) and patient survival (HR, 2.1 (1–4.1), $p = 0.037$)).

Conclusion: After liver transplantation, platelet count $<60 \times 10^9$/L at postoperative day 5 is an independent factor associated with major complications, graft failure and patient survival. These findings justify further experimental and clinical investigations to better understand the underlying mechanisms and develop protective strategies in high risk patients.

FOS205

SURGICAL ANATOMY OF LEFT – HEMILIVER AS APPLIED TO LIVING DONOR LIVER TRANSPLANTATION AND SPLIT LIVER TRANSPLANTATION

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Introduction: Living donor liver transplantation (LDLT) and split liver transplantation (SLT) are innovative surgical techniques that have evolved during the last two decades to expand the donor pool. Fundamental to the application of these techniques is an understanding of intrahepatic vascular and biliary anatomy of liver.

Methods: 50 liver specimens which were removed enbloc during postmortem examination were dissected under the magnascope with lens magnification of 2.5X in the department of anatomy, PGIMER, Chandigarh. The extra and intra hepatic arterial and biliary anatomy of left hemi-liver was studied. The observations were photographed with the digital camera (DSC-W 90, Cyber shot 8.1 megapixel, sony, japan) and schematic diagrams of the observations were made.

Results: Authors proposed a modified classification of left hepatic artery (LHA) into three types based upon its origin and segmental pattern.

Type A – Conventional origin and segmental pattern of LHA (27%)

Type B – Normal origin and variant segmental pattern of LHA (50%) – 3 subtypes

Type C – Variant origin and segmental pattern of LHA (23%) – 4 subtypes

Segmental drainage pattern of left hemiliver was classified into 4 types according to union of segment II, III & IV ducts in relation to umbilical fissure and drainage of segment IV.

Type 1 – Conventional (56.6%)

Type 2 – Triple confluence of segment II, III and IV ducts (3.3%)

Type 3 – Segment IV duct draining into segment III duct (16.6%)

Type 4 – Dual drainage of segment IV (23.3%)

Conclusion: We observed a high prevalence of surgically important vascular and biliary variants in left hemiliver. Close attention needs to be paid to these potential anatomic variations during the process of graft splitting.

FOS206

PREDICTIVE VALUE OF MELD SCORE FOR SURVIVAL AFTER LIVER TRANSPLANTATION IS POOR IN LIVING DONOR LIVER TRANSPLANTATION

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Introduction: Model for End-Stage Liver Disease (MELD) score as a prognostic factor is a still controversial issue in

liver transplant recipients. The objective of this study was to evaluate the predictive ability of the MELD score for outcomes after living donor liver transplantation (LDLT) to exclude various donor factors of deceased donor.

Methods: Among the 238 consecutive liver transplantation in Yonsei University Health System between Sep, 2005 and Dec, 2010, 13 pediatric, 80 (33.7%) deceased donor liver transplantations and 6 (4.1%) liver transplantation due to acute fulminant hepatic failure were excluded. Total 139 LDLT recipients were divided into a high (≥25), moderate (15~24) and low (<15) MELD score group. All living donors were strictly evaluated their liver function about steatosis, anatomy and volume by biopsy, MRI and CT. We retrospectively analyzed the data concerning clinical characteristics such as ascites, hepatic encephalopathy and hepatorenal syndrome, and patients' survival rate.

Results: Mean follow up periods was 34.2 ± 19.8 months. Mean age was 51.1 ± 8.0 years. There were 110 male and 29 female patients. The mean MELD score was 14.5 ± 8.0. Twenty one recipients in high MELD score group, 27 recipients in moderate score group, and 91 recipients in low score group were included. Clinical manifestations except pre-transplant recipient status did not significantly different by the pre-transplant MELD score group. High MELD score group showed high prevalence of decompensate liver failure such as intractable ascites, hepatic encephalopathy, and hepatorenal syndrome. However, there was no significant differences in operative mortality, survival rate, and cause of graft failure after LDLT by the MELD score.

Conclusion: MELD score showed good relation with clinical symptoms such as ascites, encephalopathy and hepatorenal syndrome. However, in the setting of LDLT with homogenous donor condition, MELD score did not provide accurate prognostic information.

FOS207
LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA; 20 YEARS OF GREEK EXPERIENCE

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Introduction: Liver transplantation is indicated in selected patients with hepatocellular carcinoma (HCC) and cirrhosis. We present our experience as treatment approach and highlight the importance of selection criteria for patients with HCC waiting for liver transplantation.

Methods: We performed a retrospective analysis for all patients that underwent OLTx in our unit for HCC between 1992 – October 2010. The diagnosis preoperatively was mainly based on radiologic imaging, and alpha-fetoprotein levels, and less frequently on liver biopsy. In total 333 orthotopic liver transplantations were performed, with 65 of them receiving OLTx for cirrhosis and HCC, 54 males and 11 females.

Results: Average age was 47.9 ± 13.3 (33–72). From the 65 patients that received OLTx for HCC, 53 were within Milan Criteria. Underline cirrhosis due to HBV in 49 (7 HBV + HDV, 3 HBV + ALD and 1 HBV + HCV), HCV in 6, ALD in 6, and other causes in 4 patients respectively. Average Meld score was 13.4 ± 4.7 and Child-Pugh score in 14 (21%), 25 (38%), and 26 (40%) were A, B and C respectively. Maintenance immunosuppression scheme: 33 patients, received MMF with CNi, 28 patients mammalian mTORi with CNi and, MMF/mTORi in 4 patients. aFP at the time of transplantation was more than 400 ng/ml (588 ± 846) in 14 and less than 400 ng/ml (12 ± 29) in 41 patients respectively. Median survival was 51.3 months ± 44.7 (3–184), and 5-year Kaplan-Meier survival was 83%.

Conclusion: in selected patients with HCC and cirrhosis remains the best available treatment with satisfactory survival and reduced incidence of recurrence and metastasis.

FOS208
DEFINING AN OPTIMAL TREATMENT STRATEGY FOR RECURRENT HEPATOCELLULAR CARCINOMA: SALVAGE LIVER TRANSPLANTATION, REPEATED HEPATIC RESECTION OR RADIOFREQUENCY ABLATION?

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Introduction: The most optimal treatment strategy for patients with recurrent hepatocellular carcinoma (rHCC) remains poorly defined. The purpose of this study is to compare the efficacy of salvage liver transplantation (SLT), repeated hepatic resection (RHR) and radiofrequency ablation (RFA) in patients who had intrahepatic recurrence after treatment of primary HCC within Milan criteria, so as to define an efficacious treatment algorithm for this disease entity.

Methods: From June 1997 and June 2010, 504 patients received either hepatic resections or RFA for primary HCC within Milan criteria in our center. In all, 186 patients (37.4%) developed intrahepatic recurrences and 92 of them underwent SLT (n = 19), RHR (n = 25) or RFA (n = 48). The median MELD score at tumor recurrence in SLT, RHR and RFA group was 10.7, 7.5 and 8.2 respectively (p = 0.001). Their clinicopathological data and survival outcomes were reviewed. Survival outcomes were estimated by Kaplan Meier method and were compared between each group by log-rank test. P-value <0.05 was considered to be significant.

Results: 78 out of 92 patients (84.8%) developed rHCC within Milan criteria. SLT was performed using living donor grafts in 16 patients and deceased donor grafts in 3 patients. The 1-, 3- and 5-year tumor-free survival rates for SLT were 68.4%, 57.9% and 57.9%; for RHR were 71.0%, 51.6% and 45.2%; and for RFA were 43.0%, 22.5% and 9.0% respectively (p = 0.001). For rHCC within Milan criteria, the 1-, 3- and 5-year tumor-free survival rates for SLT were all 60.0%; for RR were 70.2%, 48.0% and 48.0%; and for RFA were 43.9%, 23.0% and 9.2% respectively (p = 0.004). Subgroup analysis showed that SLT and RR attained

comparable survival outcomes, and both treatments attained significantly better survival outcomes than patients receiving RFA ($P < 0.05$).

Conclusion: SLT is an efficacious treatment for patients who had post-resection or post-RFA tumor recurrence. It should be recommended to patients when RHR becomes unfeasible. Nonetheless, future study is needed to justify its application to rHCC beyond Milan criteria.

FOS209
LIVING DONOR LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA: VALIDITY OF OUR EXPANDED CRITERIA

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Introduction: Expanded selection criteria for liver transplantation (LT) for hepatocellular carcinoma (HCC) can be justified when the criteria show acceptably low recurrence rate. We recently proposed new selection criteria for patients with HCC in living donor LT (LDLT) using the combination of tumor number, tumor size, and tumor marker considering tumor biological behavior. In the present study, we analyzed validity of the new criteria.

Methods: We retrospectively analyzed 196 patients who underwent LDLT for HCC at our institute between February 1999 and October 2011. The median observation period was 89 months (range, 3–155 months). Until 2006, we performed LDLT for HCC under the inclusion criteria that HCC unsuitable for other treatment modalities, without extrahepatic metastasis or macroscopic venous invasion on preoperative imaging, and no restrictions on the number or size of tumors. Since 2007, we have implemented new extended criteria (Kyoto criteria), combination of 3 independent risk factors for recurrence: tumor number 10 or less, all tumors 5 cm or less in diameter, and des-gamma-carboxy prothrombin level 400 mAU/ml or less.

Results: The 5-year recurrence rate for patients who met the new criteria was significantly lower than for patients who exceeded them (4% vs. 52%, $p < 0.001$). Similarly, patients who met the new criteria showed a significantly better 5-year survival rate (82% vs. 41%, $p < 0.001$). One hundred and forty patients (71%) received pretreatment for HCC. Among these, 19 recipients underwent liver resection before LDLT. The survival rate and recurrence rate did not differ between patients with or without pretreatments. In patients who underwent LDLT following hepatectomy, patients meeting the Kyoto criteria ($n = 15$) showed a significantly higher survival rate and lower recurrence rate than patients beyond the Kyoto criteria ($n = 4$) ($p = 0.005$, $p = 0.011$, respectively).

Conclusion: The Kyoto criteria are simple and useful expanded selection criteria for LDLT for HCC.

FOS210
DEVELOPMENT OF EARLY ANASTOMOTIC BILIARY STRICTURE AFTER LIVER TRANSPLANTATION: WHEN BILIARY STENTING IS REQUIRED?

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Introduction: Despite improved surgical and medical care, biliary complications are still a major source of morbidity after liver transplant. Of the biliary complications, leaks and strictures are the most common. Early Strictures at the site of the bile duct anastomosis stricture (AS) are thought to result from surgical technique and/or local ischemia. However, early AS is often not well defined and the true incidence remain to be defined.

Methods: The prevalence, presentation, results of treatment, and patient survival of grafts developing an early AS within 90 days from liver transplantation were evaluated. Data of 563 adult liver transplantations performed between January 2000 and May 2011 were analysed. Clinical and laboratory information were obtained from a prospective maintained database, and radiological studies were re-evaluated. In particular, efficacy of early stenting was evaluated.

A successful biliary stenting was defined as a reduction of serum level of bilirubin of at least 40% within two days from the procedure in the absence of other complications.

Results: Twenty-eight grafts (4.9%) showed an early AS: 26 in duct-to duct anastomoses, and 2 in hepaticojejunal Roux-en-Y anastomoses. All patients were successfully treated by 1 or more treatment modalities. ERCP was successful in 10 of 26 (38%) cases. In 6 of 16 patients who did not benefit from stenting, liver biopsy showed evidence of rejection or HCV recurrence. The remaining 10 patients improved spontaneously within 10 days.

An ALT serum level of more than 150 U/L, older age of donor, HCV status, were all associated with a reduced likelihood of improving from stenting. The only Independent risk factor for early AS was bile leak. Graft and patient survival were not impaired by early AS.

Conclusion: Significant early AS is a relatively uncommon complication after liver transplantation. The finding of AS at ERCP not always indicated a significant stenosis requiring stenting.

FOS211

THYMOGLOBULINE PRE-TREATMENT AND MINIMIZATION OF IMMUNOSUPPRESSION WITH ADVAGRAF IN LIVER TRANSPLANTATION ALLOWS INCREASE OF T-REG FOXP3+ CELLS AND GUIDANCE OF TOLEROGENESIS. RESULTS OF A PROSPECTIVE RANDOMIZED TRIAL

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Introduction: The role of FOXP3+ Treg cells has strongly emerged in the mechanisms of tolerogenesis and maybe crucial for determining an effective therapeutic intervention. We designed a tolerogenic regimen of recipient pretreatment with Thymoglobuline and gradual minimization of immunosuppression (IS) in a Advagraf-based prospective trial to investigate whether this approach in liver transplantation could actively induce expansion of Tregs and effectively guide progressive reduction of immunosuppression.

Methods: Thymoglobuline pre-treatment (3 mg/kg once-only i.o. dose) followed by low-dose Advagraf monotherapy (group A) or Advagraf + Certican (group B); IS levels were reduced by half at 6 and 12 months in clinically stable patients. Venous blood samples were prospectively collected at time of LTx and then every 3 months, before any reduction of IS, together with clinical data and levels of IS. PBMC were collected, and the absolute number (c/μL) and percentage (%) of different T-cell subsets (CD8, CD4, CD25, and FOXP3+ Treg) were measured by means of standard flow cytometry. Liver biopsies were also serially obtained to search for subtle histological signs of immune activation.

Results: 15 patients have been enrolled so far; from the baseline values Thymoglobuline caused a mild decrease of CD4 and CD8 at T3 (CD4: 320 c/μL, 38%; CD8: 266 c/μL, 32%), although a steady increase was noticed up to T12 in CD4 (CD4: 334 c/μL, 44%) but not in CD8 (CD8: 171 c/μL, 23%). % of CD4+CD25+ constantly increased from baseline (20.3%) to T12 (64.3%), and, similarly, Treg showed increase from 9.57% to 12.48% (max 15.48% at T6), and from 31 c/μL to 44.7 c/μL (max 47.3 c/μL at T3). Freedom from rejection was complete in all 15 patients despite very low levels of IS (mean ADV/CERT levels first 6 months: 5.0/4.1 ng/ml; months 6–12: ADV/CERT 2.5/1.87 ng/ml). No histological signs of immune activation was found in all histological serial samples.

Conclusion: Induction with Thymoglobuline and minimization of IS in an Advagraf-based protocol is safe, allows full control of rejection and permits a remarkable expansion of Treg, which may be usefully applied as a "tolerogenic" monitoring tool for guidance in IS reduction.

FOS212

RISK FACTORS OF BILIARY COMPLICATIONS AFTER LIVING DONOR LIVER TRANSPLANTATION, MANSOURA EXPERIENCE

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Introduction: Biliary complications remain a major problem despite all surgical and immunological advances in the field of liver transplantation. Reports in recent literature indicate that biliary complications in adult living donor liver recipients ranges from 14% to 46%. Biliary leaks are more common than strictures in living donor. In this retrospective study we present our experience in adult LDLT and incidence of biliary complications in both recipients and donors and their management.

Methods: From May 2004 to October 2011. We have 150 patients underwent LDLT; 139 males and 11 females. We have 64 right lobe graft with single bile duct, 78 grafts with two bile ducts and 8 grafts with triple orifices. We have done 78 single biliary anastomosis, 67 double anastomosis and 4 triple anastomosis and one Hepatico. Extrahepatic dissection and division of the right hepatic duct was done in first 109 donors while intrahepatic dissection after parenchymal resection was done in last 41 cases.

Results: Biliary complications occurred in 35 recipients (23.3%) in the form of 28 cases of biliary stricture and 7 cases of only bile leak. The incidence of complication was significantly affected with the number of bile ducts and extrahepatic versus intrahepatic resection of bile ducts. Twenty three cases needed intervention in the form of endoscopic balloon dilatation and stenting in 14 cases and bilioenteric anastomosis in 9 cases. Biliary leak occurred in 17 donors from whom 4 donors only underwent treatment in the form of endoscopic stent in 3 and surgical exploration in one. Four cases of our recipient mortality resulted from uncontrolled biliary sepsis.

Conclusion: Biliary complications are the most common and important surgical problems after LDLT. The incidence of biliary complication is related to the number of lumens on the graft surface and technique of resection. Endoscopic treatment of biliary stricture is useful and should be attempted first. Surgical reconstruction in the form of hepaticojejunostomy is done when endoscopic treatment failed.

FOS213

THE PLACE OF SPLIT AND LIVING DONOR GRAFTS IN LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA – A WESTERN EXPERIENCE ABOUT 743 CASES

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Introduction: Graft shortage is a major problem in liver transplantation (LT). In the field of hepatocellular carcinoma (HCC), it leads to drop-out in case of tumor progression. Therefore, all source of grafts have to be considered, as partial ones. Comparing to whole grafts (WG group), partial grafts (PG group) are associated with several drawbacks, as liver regeneration, which can theoretically impair final results. The aim of the study was to compare PG to WG in LT for HCC.

Methods: From January 1999 to December 2009, 743 patients underwent LT for HCC in 5 French centers. 593 received a WG, 150 received a PG (79 living donors and 71 split LT for cadaveric donors). 535 (72%) patients were in Milan criteria's at the time of inscription. Liver disease was due to hepatitis C (n = 251), alcohol (n = 219), hepatitis B (n = 99), mixed C-B-OH (n = 82) and other (n = 92).

All variables, known to impact recurrence, were compared in univariate analysis by a log-Rank test and in multivariate analysis by cox model analysis.

Results: Waiting time was similar in WG and PG (5.9 ± 6.7 vs 5.1 ± 7.3 months respectively). After a mean follow-up of 49.7 ± 34.5 months, 63 patients developed tumor recurrence.

Overall and disease free 5-year survival rates were 89% and 80.0% respectively. Disease 5-year free survival rates was similar in WG and PG (88.1 vs 89.8 months respectively; p = 0.355). In univariate analysis, disease 5-year free survival rates was significantly correlated with Milan criteria's (in Milan: 92% vs out Milan: 76%; p < 0.0001), AFP (AFP > 100: 78.5% vs AFP < 100: 98.6; p < 0.006), bilobar involvement (yes: 78.5% vs no: 89.5; p = 0.001), presence of satellite nodules (yes: 79.4% vs no: 93.2; p = 0.001), and macrovascular invasion (yes: 69.1% vs no: 91.5; p = 0.001). In multivariate analysis, 5-year disease free survival rates was significantly correlated with Milan criteria's (p = 0.0001), and macrovascular invasion (p = 0.001).

Conclusion: In a French Population-Based multicentric study, with 72% of the patients within Milan criteria's at the time of listing and waiting time was similar in WG and PG groups, 5-year overall and disease free survival rates were similar. 5-year disease free survival rates was significantly correlated with Milan criteria's and macrovascular invasion.

FOS214

DETERMINATION OF THE OPTIMAL SURVIVAL MODEL FOR PREDICTING MORTALITY IN PATIENTS AWAITING LIVER TRANSPLANTATION

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Introduction: Decompensated cirrhosis is associated with a poor prognosis and liver transplantation provides the only curative treatment option with excellent long-term results. The Model for End-Stage Liver Disease (MELD) score is now used for allocation in liver transplantation (LT) waiting lists, replacing the Child-Turcotte-Pugh (CTP) score. However, The optimal strategy based on scoring systems is still under debate. Aim of the study to compare the CTP scores and MELD score for 3, 6 months.

Methods: We investigated 216 consecutive patients listed for single-organ liver transplantation for nonfulminant liver disease between April 2010 and June 2011. To assess the ability of MELD and CTP score predicting the risk of death, the study was performed by range by using c-statistic for area under the receiver operating characteristic curve.

Results: 56 patients died during the observation period. The mean CTP score at baseline, 3, 6 months was 7.4, 7.8 and 8.1 respectively for patients in the waiting list 7.6, 8.9 and 9.5 respectively for patients who died on waiting. The Mean MELD at 3, 6 months was 12.2, 13.5 and 17 for patients in the waiting list and 14.8, 19.6 and 21.8 respectively for patients who died on waiting. The sensitivity and specificity to identify mortality or severe deterioration for CTP was 83.9% and 89.5%, respectively; for MELD 88.6%, 91%, respectively. In stratified analysis there were significant (<0.001) differences between MELD and CTP for the c-statistic in patients with low and intermediate range MELD scores at 3 and no significant differences in 6 months.

Conclusion: MELD has a better performance over the CTP score in determination of priorities for organ allocation. The outcome with lower range MELD cannot be reliably predicted only with their MELD scores, and alternative prognostic markers should be used in conjunction to enhance the predictive accuracy. Because in patients with a longer time on waiting list CTP may serve as an additional factor for assessment of patient prognosis. So, prognostic markers like ascites and hyponatremia should be added with MELD to enhance the predictive accuracy.

FOS215

EARLY AND LATE BILIARY COMPLICATIONS OF LIVING-RELATED LIVER TRANSPLANTS IN CHILDREN

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Introduction: Living-related liver transplants (LRT) remain an important option for pediatric patients with end-stage liver disease. Over a 13 year period we performed 51 LRT in 50 patients. Follow up was from 6 to 18 years (mean = 13.8

years). We reviewed early and late biliary complications in this cohort of patients.

Methods: After IRB approval, a retrospective review was made of all pediatric LRT cases performed between November 1992 and May 2005. Patient demographics, graft type, number of bile ducts, donor characteristics, complications and outcomes were assessed. Early and late biliary complications were examined. Follow up was 100%.

Results: Fifty pediatric patients received 51 LRT grafts. Seventeen had biliary complications (34%). Majority (71%) occurred in the first 3 months post transplant. Early complications were bile collections or leaks (57%), hepatic abscess with biliary communications (9.5%) and an obstructed Roux-en-Y (4.7%). Late complications after 3 months were strictures at the Roux-en-Y anastomosis (24%) or multiple strictures (4.7%). Late strictures occurred between 6 months and 12 years post transplant. The majority (73%) of early complications were treated by operative drainage or revision of Roux-en-Y. All late complications were managed non-operatively with percutaneous stenting. Graft and patient survival was not influenced by biliary complications.

Conclusion: Biliary complications are a frequent complication of LRT occurring in up to one-third of patients. Early complications of bile leak or biloma, most often require operative repair. Overall, biliary complications did not contribute to patient mortality or graft loss.

FOS216
TEN YEARS OF LIVING DONOR LIVER TRANSPLANTATION: OUTCOME DATA FROM EGYPTIAN LIVER TRANSPLANTATION REGISTRY

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Introduction: Living donor liver transplantation (LDLT) is known to be an established acceptable therapeutic modality for end stage liver diseases, especially when cadaveric liver transplantation is not available like in Egypt. We present the outcome of 1385 LDLT cases performed in the last ten years in Egypt.

Methods: Between August 2001 to August 2011, 1385 LDLT cases were performed in ten centers, adults represented 1275 (92%, mean age 54 years) while 110 (8%) were pediatric cases (mean age 8 years). The main indication for LDLT in adults was HCV cirrhosis (95%, with or without HCC) with mean MELD score 18. While the main indication in the pediatric age group was biliary atresia (52%). Three hundred sixty adult patients were diagnosed to have hepatocellular carcnioma (HCC). Out of those, 310 recipients (86%) were within Milan criteria. Down staging was performed in 42 cases (12%) by liver resection, radiofrequency ablation and/or trans-arterial chemo-embolization (TACE). A single pediatric case of central hepatoblastoma received LDLT and chemotherapy.

Results: The operative mortality was 19 recipients. Donor mortality was three (0.2%); the first one 3 months post donation due to biliary leak, septicemia and multi organ failure, the second case died 12 days after donation due to portal vein thrombosis and the third was due to sub-clavian artery injury. In the adult group, recipient mortality was 31.4% versus 22.7% for the pediatrics. Biliary complications was24.7% and clinical HCV recurrence was 9% requiring anti-viral treatment. In adult recipients with HCC, first year recurrence occurred in 24 recipients (10%), the 3 years recurrence was 15%, the 5 year survival was 58% and the mortality rate due to tumor recurrence was 13.6%. The hepatoblastoma case is doing well for 7 years with no recurrence.

Conclusion: Living donor liver transplantation is a potentially safe procedure especially when cadaveric liver transplantation is not available in some countries like Egypt. The long term survival and disease free survival rate in patients with HCC transplanted by LDLT is comparable with those using diseased donors. Although LDLT had reasonable outcomes; yet, it carries considerable risks to healthy donors, it lacks cadaveric back up, and is not feasible for all patients.

FOS217
SURGICAL ANATOMY OF ARTERIAL SUPPLY OF SEGMENT IV OF THE LIVER AND ITS RELEVANCE TO LIVING DONOR LIVER TRANSPLANTATION AND SPLIT LIVER TRANSPLANTATION

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Introduction: Preoperative evaluation of arteries supplying segment IV is critical and may impact the surgical planning during split liver transplantations & living donor liver transplantations.

Methods: Dissections was performed on 50 liver specimens which were removed enbloc with abdominal aorta during postmortem examination. Liver were dissected under the magnascope with lens magnification of 2.5X in the Department of Anatomy, PGIMER, Chandigarh. Hepatic artery was dissected from its origin. Arterial supply of segment IV was carefully identified and recorded. The observations were photographed with a digital camera (DSC-W 90, Cyber shot 8.1 Megapixel, Sony, Japan) and schematic diagrams of the arteries were made subsequently.

Results: The variant patterns of artery to segment IV were classified into five types according to its source of origin, its extra and intrahepatic course and arterial configuration of liver – normal or aberrant.

Artery to segment IV

- Extrahepatic branch was labeled as Middle hepatic artery (MHA, 80%)
- Intrahepatic branch that originated inside the umbilical fissure from left hepatic artery (LHA) or from one of its segmental branches was labeled as Segment IV artery (A4, 20%)

Classification of origin of artery to segment IV

Type 1 – left hepatic artery, LHA (27%)

Type 2 – right hepatic artery, RHA (17%)
Type 3 – common/ proper hepatic artery, CHA/PHA (23%)
Type 4 – Dual (13%)
Type 5 – A4 (20%)

Conclusion: The patterns observed in the present study reflect the embryological pattern of arteries & the classification formed may favorably influence the outcome of living donor liver transplantations. In the livers with normal hepatic arterial configuration, MHA arose either from LHA or RHA whereas in livers where arterial anatomy was aberrant, MHA arose from CHA. There was no case in which MHA was arising from replaced/accessory vessel. A4 was seen to be arising from one of the segmental branches of LHA and all the livers had normal hepatic arterial anatomy.

FOS218
USE OF HEPATIC INTRA-ARTERIAL INFUSION OF YTTRIUM-90 MICROSPHERE AS DOWNSTAGING AND BRIDGE TO LIVER TRANSPLANTATION IN PATIENTS WITH HEPATOCELLULAR CARCINOMA

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Introduction: Yttrium-90 microspheres radioembolization (Y90-RE) is an effective modality of treatment in patients with advanced hepatocellular carcinoma (HCC) who are not otherwise candidates for local ablation, surgical resection, or liver transplantation (OLT). Its use in downstaging HCC or as a bridge for OLT is however still unclear. Here, we present our experience with Y90-RE in patients with advanced HCC who were intentionally treated in order to meet the Milan criteria for OLT.

Methods: Among 127 Y90-RE for HCC performed with the collaboration of the National Cancer Institute Regina Elena, 13 patients with HCC were treated with the intention of downsizing the tumor within the criteria in 9 cases and as bridge in 2 cases in order to pursue OLT.

Results: Eight (61%) patients were treated before listing and 5 (39%) were treated on the waiting list because of tumor progression. Of those treated before listing, 6 (75%) patients were downstaged within the criteria (4 were transplanted and 2 are waiting for OLT) but two (25%) died on waiting list. On the waiting list, 1 (20%) patient was transplanted, 3 (60%) died on the list and 1 (20%) is alive with disease control 2 years after Y90-RE. Two patients who had neoplastic infiltration of a portal vein branch. After treatment with Y90-RE in both patients was noted disappearance of the thrombus. The extrahepatic spread was ruled out and later they were transplanted. Now they are both alive at 25 and 14 months without signs of HCC recurrence.

Conclusion: Y90-RE is currently used in our centre as an effective modality of treatment in patients with HCC as downstaging method or as a bridge to liver transplantation.

FOS219
BACTERIAL TRANSLOCATION AND LIVER TRANSPLANTATION: A PROSPECTIVE STUDY

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Introduction: Cirrhosis and portal hypertension are correlated with a high prevalence of bacterial translocation (BT) that is associated with severe episodes of sepsis especially in patients underwent liver transplantation (LT).

Methods: Between October 2007 and September 2009, 86 patients underwent LT without temporally portal shunt. A routinely peripheral venous sampling was performed at induction of anaesthesia, at the end of vacular clamping, in Intensive care unit, and in cases of post-transplantation Systemic Inflammatory Response Syndrome. A routinely portal vein blood culture was performed at the end of the vascular clamping. Portal blood cultures were compared with the systemic blood cultures. Risk factors of BT were analyzed.

Results: There were 65 men and 21 women. The mean clamping time was 122 min (range: 60–250). Portal blood culture was positive in 23 patients among 11 had systemic blood positive culture. The blood culture was positive for gram+ bacteria. The overall and infectious morbidity rate were 36% (n = 31) and 14% (n = 12) respectively. The mortality rate was 6.9% (n = 6). There was not difference between the 2 groups BT and no BT in term of overall morbidity (52% vs 30%, p = 0.06) and infectious complications (21.7% vs 11.1%, p = 0.21). There was no statistically correlation between BT and the duration of portal clamping and the mean MELD score.

Conclusion: Despite the absence of statistically differences, it appears a trend of increased complication rate with BT. A study comparing the achievement of a temporary portal shunt on the occurrence of BT and infectious complications should be performed.

FOS220
ASSESSMENT OF LATE CHRONIC REJECTION IN LIVER GRAFT RECIPIENTS RECEIVING LOW-DOSE IMMUNOSUPPRESSION

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Introduction: Calcineurin Inhibitors (CNI) represent the cornerstone immunosuppressants (IS) after liver transplantation (LT) despite their side effects. As the liver is a particularly well-tolerated organ, low or nil doses of CNI

could have been proposed in the long-term. The aim of this study was to assess prevalence of asymptomatic chronic rejection (CR) in low-doses (LD) patients group and to compare their characteristics with standard-doses (SD) group patients.

Methods: All living patients without recurrence of cirrhosis transplanted between 1997 and 2004 (excluding combined transplantation or retransplantation) were included and divided into 2 groups according to their CNI blood levels (BL). Patients in LD group (n = 57, 59%) had tacrolimus baseline BL < 5 ng/mL or ciclosporin BL < 50 ng/mL at t0 or <100 ng/mL at t + 2 h. Thirty-six of 57 patients had a liver biopsy (LB) searching for CR according to Banff criteria. Other patients were included in SD group (n = 40, 41%).

Results: Among patients with LB (performed 90 m (64–157) after LT), 56% had CNI alone, 36% CNI + other IS and 8% had only other IS. CNI were below therapeutic levels for 41 m (11–115) and liver tests were normal in 72%. No chronic rejection was found.

Comparison between LD and SD groups: in LD group, decrease of CNI occurred 48 m (12–134) after LT. Patients were included 46 m (15–115) after decrease. Patients in LD group had more hepatitis B (23% vs 8%, p = 0.045), a better renal function (86% of initial clearance vs 70%, p = 0.040) and less acute rejection episodes (1.2 vs 1.7, p = 0.028). Decrease of CNI without liver tests elevation was favored by prescription of other IS and failed in 6% of patients without impacting on graft function.

Conclusion: It is possible to decrease, even stop, CNI in the long term after LT for most of the patients, without chronic rejection.

FOS221
DONOR WASHOUT EFFICACY IS INDEPENDENT OF WASHOUT PRESSURE, TEMPERATURE, AND SOLUTION

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Introduction: Erythrocyte retention after donor organ washout leads to impaired graft viability. Low viscosity washout solutions (histidine-tryptophan-ketogluterate, HTK) are believed to show less erythrocyte retention than high viscosity solutions (University of Wisconsin, UW and Polysol, PS). This colloid induced difference in viscosity and the agglutinative effect of colloids (HES and PEG) upon erythrocytes potentially impairs organ washout.

Methods: To quantify the erythrocyte retention after organ washout using different preservation solutions and at different temperatures and perfusion pressures, we washed out rat livers (n = 5 per group) using 50 mL HTK, UW, PS or Ringer lactate (RL) via the portal vein at 4°C or 37°C and at 15 mmHg or 100 mmHg. The control group was not flushed and ligated in situ. At start of the experiments, erythrocytes were labeled in vivo using 99mTc pertechnate. After washout, livers were removed, weighed, and placed in a scintillation analyzer. Erythrocyte retention was expressed as radiation per gram of liver relative to radiation per gram of blood (weight percentage), and corrected for weight and 99mTc uptake. Statistics were performed using a one-way ANOVA.

Results: No significant differences were seen in erythrocyte retention for any of the solutions after washout at 4°C or 37°C nor at 15 mmHg or 100 mmHg. Washout time was shorter at 100 mmHg and at 4°C for PS and UW ($P < 0.001$), and at 37°C, for PS, UW, and HTK ($P < 0.001$). Washout times were twice as long for PS and UW compared to HTK and RL at 4°C ($P < 0.001$), being an average of 95.97 ± 14.51 seconds and 33.37 ± 10.41 seconds, respectively. At 37°C this difference was not significant.

Conclusion: In conclusion, the addition of a colloid to a washout solution does not increase erythrocyte retention. Non-colloidal solutions and high washout pressure, however, shorten the duration of washout.

FOS222
BILIARY ANASTOMOTIC STRICTURE AFTER ORTOTOPIC LIVER TRANSPLANTATION: THE UNIVERSITY OF SAO PAULO EXPERIENCE

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Introduction: Biliary stricture continues to be one of the most important life-threatening complications after orthotopic liver transplantation (OLT). The aim of the present study was to evaluate the patients' characteristics, the modality of diagnosis and the treatment approach of the non-ischemic biliary stenosis following OLT in the Clinicas` Hospital of the University of Sao Paulo.

Methods: From 2002 to 2010, we performed 567 OLT and 49 of them (8.6%) had anastomotic biliary structure after cadaveric OLT. Patients with concomitant arterial thrombosis and living donor transplantation were excluded of the present study. In 47 cases (96%), we performed an end-to-end hepatic duct anastomosis without T-tube with a 6-0 running suture and in 2 cases (4%) we did a Roux en Y biliary reconstruction. We analyzed the preoperative pathology, preoperative MELD and child-pugh scores, age, gender, cadaveric donor characteristics, diagnosis modality and the treatment approach.

Results: There were 36 males, the mean age was 46.6 years old (range 9–69) and the mean child-pugh score was 9.7 (range 7–14). Six patients (12.2%) had HCV cirrhosis and six patients (12.2%) had fulminant hepatitis. The mean preoperative MELD score was 29.1 (range 10–42). Cold ischemia time range 2.4 hours to 14 hours (average 6.7 hours) and the mean warm ischemia time was 44.7 minutes (range 33–80). The mean donor age was 46.6 years old (range 13–74). The mean time of the biliary stricture diagnosis was 9.3 months (rage 3 days–51 month). In 14 cases (28.5%) abdominal ultrasound showed intra or extra hepatic dilatation and in 35 patients the ultrasound examination did not show any sign of biliary stricture.

Conclusion: Anastomotic biliary stricture presented a high incidence of morbidity but a very low prevalence of

mortality. The MRI was the non-invasive gold-standard method for biliary stricture diagnosis. The endoscopic approach was the first choice of treatment following by the percutaneous method with an overall technical success rate of 57%.

FOS223
LIVING DONOR LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA

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Introduction: The aim of this study was to evaluate the outcome of living donor liver transplantation (LDLT) for hepatocellular carcinoma (HCC).
Methods: We retrospectively analyzed the clinical data of 180 patients, who had received LDLT (n = 34) or deceased donor liver transplantation (DDLT, n = 146) for HCC, compared overall and tumor-recurrence survival between LDLT and DDLT, and identified the risk factors of tumor recurrence and prognosis by univariate and multivariate analysis.
Results: The 5-year overall survival and tumor-recurrence survival rates were 53% and 58% in DDLT group, and 60% and 60% in LDLT group, respectively. There was no significant difference in overall (P = 0.85) and tumor-recurrence (P = 0.89) survival between these two groups. The tumor recurrence rates were 26.5% in DDLT group and 17.8% in LDLT group, respectively (P = 0.25). Multivariate COX regression model analysis identified vascular invasion (relative risk 2.118, 95% confidential interval 1.201, 4.353, P = 0.032) and tumor beyond UCSF criteria (relative risk 3.490, 95% confidential interval 1.862–8.207, P = 0.015) as independent risk factors of tumor recurrence, and tumor beyond UCSF criteria as independent predictors of prognosis.
Conclusion: LDLT is a safe and effective procedure for patients with HCC, but further studies are required for selection criteria of recipients and higher HCC recurrence rate after LDLT.

FOS224
REDO LIVER TRANSPLANTATION: LESSONS LEARNT FROM A 25-YEARS EXPERIENCE IN ADULT RECIPIENTS

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Introduction: Redo liver transplantation (RLT) may be indicated in highly selected patients experiencing severe complications following LT. Because of a dramatically high postoperative mortality, indications for RLT are cautiously weighted. This study aimed at evaluating the outcomes and risk factors of failure to improve the patients' selection process.
Methods: 1600 LT were performed at our institution between 1987 and 2011, which included RLT in 143 cases (9%). A retrospective analysis of these 143 cases was performed.
Results: In 14 cases, primary LT had been performed during childhood (child-adult group). Indications for RLT were vascular (23%), cholangitis (23%), chronic rejection (17%), non- or dysfunction (20%) and disease recurrence (8%). Postoperative morbidity was mainly due to biliary (25%) and arterial (13%) complications. One-, 5- and 10-yrs overall and graft survival were 60%, 52% and 39% and 55%, 46% and 32%, respectively. Better survival (90% and 85% at 1- and 5-yrs, p = 0.02) was noted in the group of patients retransplanted for cholangitis and in the child-adult group (86% and 74% at 1- and 5-yrs, p = 0.12). Multivariate analysis showed renal failure (p < 0.02) and transfusion greater than 7 units (p = 0.005) to be associated with an impaired survival.
Conclusion: The graft shortage and the dramatic postoperative outcomes call for a stringent selection of the patients before RLT. Yet, the subgroups of adult patients initially transplanted during childhood and those retransplanted for cholangitis experience good postoperative outcomes and seem to be the best candidates.

FOS225
EVOLUTION OF THE INDICATIONS TO VENO-VENOUS BYPASS AND LONG TERM RESULTS OF ITS APPLICATION IN LIVER TRANSPLANT RECIPIENTS – SINGLE CENTRE EXPERIENCE

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Introduction: Veno-venous (VVB) had been introduced to liver transplantation (OLT) to minimize hemodynamic changes following inferior vena cava (IVC) clamping. Progress of transplant medicine changed the use of VVB from routine to selective, in certain clinical situations. Nowadays there are still no generally accepted indications for VVB use. The aim of the study was to analyze the indications for VVB and the results of routine and selective bypass use during OLT.
Methods: Two groups of patients operated on with VVB use in years 1999–2003, who had complete hemodynamic monitoring, were retrospectively analyzed: group A consisted of 50 cases from years 1999–2001 – the period of routine VVB use, and group B consisted of 35 cases from years 2002–2003, when VVB was used selectively. The analysis of indications for VVB, a number of hemodynamic parameters (HR, MAP, CPV, CI, SVRI), the temperature and the need for vasopressor agents in the three phases of the procedure were analyzed. Complications and long-term results were compared. Statistical analysis was performed with the use of U Mann-Whitney test in Statistica version 8 program.
Results: The majority of indications for VVB use resulted from intraoperative difficulties. There were: huge collateral

circulation (22%), significant hepatomegalia (17%), large-for-size graft (14%) and large tumor of the recipient's liver (11%). Hemodynamic parameters did not differ between the groups. Patients from group B needed significantly higher doses of vasopressor agents. The rate of complications associated with VVB use was 30% and 31% in group A and B respectively. The great majority of complications were mild. Serious fatal complication, pulmonary embolism, was observed in one case in each of the groups. Long term results of OLT were similar except for 5-year survivals, that were lower in group B compared to group A (72 vs 85%, p = 0.01).
Conclusion: Bypass enables to decrease the rate of contraindications for OLT and a number of high risk patients are given the chance for successful transplantation. Hemodynamic parameters of high risk patients are similar to those of all recipients. VVB is a relatively safe method, however every decision of VVB use should be based on important indications due to the risk of rare, but potentially fatal complications.

FOS226
SURVIVAL IN REDO LIVER TRANSPLANT COMPARABLE WITH PRIMARY LIVER TRANSPLANTATION WHEN RECURRENT HEPATITIS C EXCLUDED

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Introduction: Retransplantation (re-OLT) is the only treatment option for allograft failure, however it remains controversial given the scarcity of organs and decreased survival compared with primary transplantation. Survival also differs according to the etiology of allograft failure. We examined outcome after re-OLT at this institution.
Methods: Sixty four (7.6%) patients with a previous liver transplant (re-OLT) were identified retrospectively from the 845 adult liver transplants done at this institution between 1/1/2000 and 12/31/2011. Mean time between primary and re-OLT was 4.4 years (±6.0). 27 re-OLT patients (42%) were originally transplanted for hepatitis C, 11 (17%) had primary sclerosing cholangitis and the others (41%) were miscellaneous. Eight (29.6%) of the 27 hepatitis C patients were retransplanted for recurrence with an interval of 5.9 years (±5.1). Demographics, preoperative morbidity, and outcomes were examined. Statistical analysis used Student-T, Chi-Square test as appropriate and Log-Rank test for Kaplan-Meier curves.
Results: Re-OLT patients were younger (p = 0.005), with lower BMI, (p = 0.0008) than primary OLT but had higher MELD scores (21.4 vs 26.6, p = 0.0001). Operative times were longer for re-OLT (p = 0.001) and blood transfusion were greater (p = 0.0001). ICU (5 vs 11 days p = 0.0001) and hospital stays (12 vs 22.6, p = 0.001) were significantly longer in the re-OLT group. Overall survival at 1, 3 and 5 years for retransplantation was 77.7, 70.0 and 64.2% which was lower than survival for first time transplants (90.0, 85.3 and 79.6% p = 0.0085). However this significance was lost when the 8 recipients undergoing re-OLT for recurrence of hepatitis C were removed from the analysis and no difference in survival between re-OLT and primary OLT was then seen (81.7, 73.1 and 70.4, p = 0.1).
Conclusion: Liver re-OLT had equivalent outcomes to primary transplants for indications other than hepatitis C recurrence. Furthermore, patients originally transplanted for hepatitis C who received a second graft for reasons other than recurrence had good survival and should be considered for repeat transplantation.

FOS227
LIVER TRANSPLANT OUTCOMES USING GRAFTS FROM DONATION AFTER CARDIAC DEATH (DCD) DONORS

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Introduction: Previous reports suggest that DCD liver grafts have increased primary non-function (PNF) and biliary cholangiopathy. Warm ischemia prior to cold flushing, not encountered in standard brain-death donation, is presumed to increase these complications.
Methods: Between January 2005 and June 2011 574 adult liver transplants were performed at our institution. Thirty-one (5.4%) patients received DCD donor grafts. A prospectively maintained database was utilized for the current analysis. Warm ischemia time (WIT) and cold ischemia time (CIT) were obtained from hospital records. Median followup was 3.8 years.
Results: DCD donors were younger (29 years, 10–60) than non-DCD (46 years, 9–80) (p < 0.0001), with similar recipient age (55 and 53.9 years, p = 0.56). MELD was lower in DCD recipients (18.4 vs 21.9, p = 0.05). Mean CIT and WIT was similar between groups (6.3 vs 5.9 hrs, p = 0.36 and 36 vs 34 mins., p = 0.20). Mean ICU and hospital stay was 2 days (p = 0.31) and 7 days (p = 0.37). DCD graft WIT was 23 mins (±8). 1-, and 5-year patient survival was 93%, and 93% in DCD vs 89%, and 77% in non-DCD (p = 0.1). Graft survival was 93%, and 85% vs 87%, and 75% (p = 0.28). 3 recipients developed ischemic cholangiopathy and were associated with increased donor WIT (p = 0.004). Two were retransplanted. Bile leak was more common in DCD recipients (19.4% vs 7.9% p = 0.04).
Conclusion: Careful selection of DCD donors can provide suitable donors with results of liver transplantation comparable to standard brain dead donors.

FOS228

MORPHOMETRIC ANALYSIS OF FIBROSIS AND INFLAMMATORY ACTIVITY IN RECURRENT HCV INFECTION. CORRELATION BETWEEN ISHAK SCORE, SIRIUS RED, AND STELLATE CELL ACTIVATION

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Introduction: Histological assessment of recurrent HCV infection usually includes semiquantitative scoring systems for the grading and staging of inflammatory activity and fibrosis. We have investigated how morphometric analysis of fibrosis and inflammatory activity can contribute to this assessment.

Methods: 78 liver biopsies taken between 6–3722 days post-transplant (median 688) were reviewed. Sections from formalin-fixed and paraffin embedded post-transplant liver biopsy specimens were stained with Sirius Red (SR), for Smooth Muscle Actin (SMA) and CD3 (T lymphocytes). The Sirius Red and SMA stained section were digitalised using the scanning function of a Leica DM6000. We used ImageJ (Version 1.42q) software and Photoshop CS5 software package for specimen analysis. The staining proportionate area was calculated as described by Calvaruso et al Hepatology. 2009 Apr;49(4):1236–44. A cell count of lobular CD3+ve lymphocytes was carried out using a microscope grid. Semi quantitative scoring was also carried out using the Ishak scoring system.

Results: SR CPA, SMA CPA and CD3 count ranged from 0.26–29.63% (mean = 6.28%), 0.00018–35.62% (mean = 4.89%) and 1–63 (median = 13) respectively. Mean SMA CPA and mean SR CPA for each Ishak score category were as follows: 0 = 2.34% (0.25–5.37%), 1 = 3.29% (0–13.33%), 2 = 4.44% (0–11.56%), 3 = 6.64% (1.49–13.93%), 4 = 6.37% (6.02–6.83%), 5 = 7.92% (3.21–14.16%), 6 = 28.96% (22.30–35.62%) and 0 = 3.68% (0.59–5.83%), 1 = 4.67% (1.35–19.46%), 2 = 4.43% (0.61–10.00%), 3 = 8.65% (1.20–17.85%), 4 = 6.77% (5.10–8.43%), 5 = 9.79% (0.26–29.63%), 6 = 11.91% (1.60–22.22%) respectively. On univariate analysis, Ishak score correlated with SMA CPA ($r = 0.62$, $p < 0.0001$) but not SR CPA ($r = 0.226$, $p = 0.104$). There was a correlation between CD3 count and AST levels ($r = 0.437$, $p = 0.004$).

Conclusion: Digitalisation, image analysis and immunohistochemistry for CD3+ve lymphocytes contribute to the assessment of inflammatory activity and fibrosis in post-liver transplant recurrent HCV infection.

FOS229

FULMINANT HEPATIC FAILURE: FACTORS PREDICTING IN-HOSPITAL MORTALITY OF ONE-HUNDRED PATIENTS PRIORITIZED FOR LIVER TRANSPLANTATION IN A SINGLE CENTER AT SAO PAULO

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Introduction: Despite the improvements in intensive care and in liver transplantation (LT) surgery, fulminant hepatic failure (FHF) still carries high mortality rates. The search for more accurate prognostic factors could help to optimize the patient while waiting for the urgent LT. We aimed to evaluate prognostic factors for in-hospital mortality of FHF patients referred to LT.

Methods: We retrospectively studied 100 adult patients (78 female, mean age 35.5 ± 14.7 years) with FHF referred to urgent transplantation at our institution from February 2002 to June 2011. The etiologies were virus in 17% of cases, drug-induced in 29%, autoimmune in 13%, cryptogenic in 34% and other in 7%. Candidacy for LT was determined according to the O'Grady criteria. We analyzed age, sex, etiology, jaundice-to-encephalopathy time interval, grade of encephalopathy, length of stay, INR, Factor V, bilirubin, creatinine, AST, ALT, lactate and the Model for End-Stage Liver Disease (MELD). All data were collected at the time of prioritization to LT. Outcome end points were LT and in-hospital mortality with or without LT.

Results: The prioritization-to-LT time interval was 1.5 days (0 to 9) and length of stay 18 ± 27 days. The in-hospital mortality rate was 69%; 45% of non-survivors died waiting for LT. All survivors (31%) were submitted to LT. At prioritization, non-survivors showed a higher grade of encephalopathy [3 (1 to 4) vs. 2 (1 to 4)], MELD (41 ± 9 vs. 38 ± 7) and lactate (62.2 ± 45.2 vs. 33.9 ± 16.0 mg/dL) compared to survivors ($p < 0.05$). Of the 100 patients, 69% were submitted to LT and 31% died before LT. The non-LT patients showed a higher grade of encephalopathy [4 (1 to 4) vs. 3 (1 to 4)], MELD (44 ± 8 vs. 38 ± 8), lactate (78.4 ± 48.3 vs. 41.8 ± 30.6 mg/dL) and creatinine (2.60 ± 2.34 vs. 1.55 ± 1.54 mg/dL) compared to LT patients ($p < 0.05$).

Conclusion: At the time of prioritization to LT, FHF patients with a poor systemic condition, i.e., patients with encephalopathy grades 3 or 4, renal impairment, raised MELD scores and high serum lactate levels, have a higher in-hospital mortality rate even when submitted to LT, indicating poor prognosis.

FOS230

SAFETY OF GRAFT-TO-RECIPIENT WEIGHT RATIO <0.7% IN ADULT-TO-ADULT LIVING DONOR LIVER TRANSPLANTATION USING RIGHT-LOBE

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Introduction: In living donor liver transplantation (LDLT), graft-to-recipient weight ratio (GRWR) is one of the major factors for selecting donors.

Methods: From Jan 2005 to July 2011, patients who underwent adult-to-adult LDLT using right-lobe in National Cancer Center, Korea were evaluated. These patients were divided into three group; GRWR < 0.7% (A), 0.7% ≤ GRWR < 0.8% (B), GRWR ≥0.8% (C). The features of donor, recipient, operation, laboratory finding up to 1 year and small for size syndrome (SFSS) among groups were analyzed retrospectively. Overall graft survival rate was compared among groups using Kaplan-Meier method.

Results: Of 304 patients who underwent LDLT, Group A, B, and C included 21, 25, and 258 patients, respectively. Mean GRWR among groups were 0.63% ± 0.05%, 0.76% ± 0.03%, and 1.17% ± 0.25%, respectively. The minimum GRWR was 0.53% and the mean graft weight in Group A was 478.4 g ± 63.7 g. Group A showed significantly higher BMI (mean 27.03), female donor (81.0%), and SFSS (14.3%) than other groups. However, there was no difference including MELD score, Child classification, donor age, operative factors, and complications except vascular stenosis. Graft survival rate at 1, 3, and 5 years were not different among groups (100%, 90.9%, and 90.9% vs. 96.0%, 81.0%, and 81.0% vs. 94.6%, 89.1%, and 81.6%; P = 0.750). In Group A, there was no death because of SFSS.

Conclusion: GRWR <0.7% graft can be considered safely in adult-to-adult LDLT using right-lobe.

FOS231

PORTAL VENOUS GAS AFTER LIVING DONOR LIVER TRANSPLANTATION: RISK FACTORS AND CLINICAL SIGNIFICANCE

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Introduction: Portal venous gas (PVG), an ominous radiologic sign, is associated with a life-threatening underlying abdominal disease requiring urgent surgical intervention. Although PVG is occasionally detected on Dopplersonography in the early postoperative period after cadaveric liver transplantation, few reports are available on PVG after living donor liver transplantation (LDLT). The aim of this study was to clarify the risk factors and the clinical significance of PVG after LDLT.

Methods: Between March 2009 and November 2011, 26 consecutive adult patients underwent LDLT (mean age 51.9 range 24–65) at our institution. Serial Doppler sonographic examinations were performed twice a day in the first 2 weeks and once a week in the 3rd and 4th week after LDLT. 26 patients were divided into two groups: those with PVG (group A, n = 5) and those without PVG (group B, n = 21). Risk factors for PVG after LDLT were analyzed. The post-transplant liver function, morbidity and mortality were compared between the two groups. The post-transplant kinetics for transaminase (AST), total bilirubin level and prothrombin time (PT) was assessed on post-operative days 1, 3, 5, 10 and 14.

Results: PVG was detected in 5 patients (20%) on postoperative day 7.2 (range 5–10), and continued for 1.9 days (range 1–4). Surgical interventions were not required to treat PVG. Graft volume/standard liver volume <40% was the only significant predictors for post-transplant PVG (p = 0.007). MELD score, graft type, cold and warm ischemic time, a hepatic period, the type of biliary anastomosis did not influence on the incidence of PVG. Post-transplant liver function, mortality (group A vs. group B: 0% vs. 5%), duration of ICU stay (15.2 days vs. 16.4 days), and morbidity grade III (20% vs. 33%), grade IV (20% vs. 19%) were not significantly different between the two groups.

Conclusion: PVG is a transient finding that has been detected in the first 2 weeks after LDLT. Although small-for-size graft was strongly associated with PVG, there was no correlation between the finding of PVG and post-transplant liver function, the cause of hepatic failure, or subsequent death.

FREE ORALS: PANCREAS

FOS232
BILIARY COMPLICATIONS (BC) IN PATIENTS WITH ACUTE LITHIASIC PANCREATITIS (ALP)

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Introduction: Migration of gallstones causing Acute Lithiasic Pancreatitis (ALP), but the association between Biliary Complications (BC) from Acute Cholecystitis (ACh) and Persistent Papillary Obstruction (PPO) with or without Cholangitis and ALP modifies the therapeutic course of both diseases: BC and systemic or local complications of ALP. The aim of this study was to detect BC and their management in a prospective series of 1154 patients with ALP in 4 surgical centers in Rosario and Rufino – Argentina.

Methods: We have prospectively studied a group of 1461 patients with AP diagnosed by clinical, serologic and morphologic methods, from 1987 to 2011. ACh was confirmed by clinical description, ultrasound patterns and laboratory tests, and PPO were diagnosed by high level of bilirubin persisted. 79% were ALP: n = 1154. After initial treatment of ALP, antibiotic treatment was initiated in mild and severe cases, and standard treatment for BC was added once diagnosed. When fever, pain or a high level of bilirubin persisted, early surgical (endoscopic, laparoscopic or conventional) treatment was required (48 to 72 hs) due to the risk of cholangitis, sepsis and/or gallbladder perforation, increase pancreatic damage and worsening the clinical condition.

Results: Group 1: AC was diagnosed in 109 patients with ALP (9.44%). G-2: PPO was found in 52 (4.5%), and G-3: cholangitis was found in 24 (2.07%). In a total of 185 cases (16.03%), 153 patients had mild ALP and 32 had severe ALP.

G-1: 39 patients with AC received only antibiotics and cholecystectomy was performed later; early surgery was performed in 70 cases. G-2: For PPO, expectant behavior was applied in 28 cases and 24 patients underwent endoscopic papilotomy (EP) after 48 or 72 hs. In G-3: 10 cases of cholangitis were controlled with antibiotics, EP was performed in 12 patients, and 2 patients underwent surgery. Mortality was 1.3% (2 of 153) and 12% (4 of 32) from both biliary complications and mild ALP and severe ALP, respectively ($p < 0.01$).

Conclusion: The association between Biliary Complications (B.C) and ALP is not exceptional (185 of 1154: 16.03% of our cases). B.C may worsen the course of ALP with septic and/or perforating complications. In such cases, early antibiotic treatment (77 of 1154: 6.67%) and/or biliary surgery (108 of 1154: 9.36%) may be required to decrease mortality from these complications in patients with mild or severe ALP (only 6 of 1154: 1.3%, in this cases with the association between BC and ALP).

FOS233
PRIMARY HYPERPARATHYROIDISM AS A CAUSATIVE FACTOR FOR PANCREATITIS

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Introduction: Pancreatitis is commonly caused by gall stone disease or by alcohol abuse while hypercalcemia is considered to be one of the rarest cause (<1%). Association between pancreatitis and primary hyperparathyroidism (PHPT) ranged from 3.2 to 5.6%. Pancreatitis can be a diagnostic clue to hyperparathyroidism.

Methods: This is a retrospective study of patients who presented with pancreatic disease and were diagnosed to have PHPT (group A) between January 2000 to August 2008 at Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, India. Demographic details, clinical profile, and biochemical parameters were compared to patients who had PHPT but without any evidence of pancreatic disease (group B) during the same period.

Results: There were 18 patients in group A and 20 in group B. Common presentations were of acute pancreatitis in 38.9%, recurrent in 33.3% while chronic in 27.8% cases. Diagnosis of pancreatitis was made after a mean of 3 attacks. Median delay in diagnosis of PHPT was 26 and 42 months in group A & B respectively ($p = 0.3$). Extrapancreatic manifestation as nephrolithiasis was present in 66.7% in group A & 52.4% in group B ($p = 0.3$). There was no statistically significant difference in the location and weight of adenoma, occurrence and severity of pancreatitis. Mean serum calcium level was significantly higher in group A as compared to group B ($p = 0.01$). iPTH, serum phosphate, serum alkaline phosphatase were not different significantly between the two groups.

Conclusion: There is an association between PHPT and pancreatitis. Higher value of serum calcium level in patients with PHPT with pancreatic disease suggests that hypercalcemia plays an important role in the development of pancreatitis in these patients.

FOS234
ROBOTIC SPLEEN-PRESERVING DISTAL PANCREATECTOMY

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Introduction: The advanced and delicate laparoscopic techniques are usually required for safe and successful laparoscopic spleen-preserving distal pancreatectomy. Unique characteristics of robotic surgical system are thought to be useful for this minimally invasive procedure.

Methods: From September 2007 to May 2011, patients who underwent robotic spleen-preserving distal pancreatectomy for benign and borderline malignant tumor of the pancreas

were retrospectively reviewed. Perioperative clinicopathologic surgical outcomes were evaluated.
Results: Twenty-three patients were attempted for robotic spleen-preserving distal pancreatectomy, and 22 patients (95.7%) could intentionally save the spleen either by splenic vessels-conservation (SVC; 17, 73.9%), or by splenic vessels-sacrifice (SVS; 5, 21.7%). Seven patients were male and 16 were female with age of 43.2 ± 15.2 years. The body mass index was checked as 23.1 ± 3.1 Kg/m^2. Pathologic diagnosis of the resected pancreatic tumor included mucinous cystic tumor (MCT) in 6 patients, serous cystic tumor (SCT) in 5, solid pseudopapillary tumor (SPT) in 4, intraductal papillary mucinous tumor (IPMT) in 3, neuroendocrine tumor (NET) in 3, and other benign conditions (intrapancreatic accessory spleen and chronic pancreatitis) in 2.
Conclusion: Robotic surgical system is thought to be beneficial for improving spleen-preserving rate in laparoscopic distal pancreatectomy. However, its expensive cost is a great obstacle for popular clinical use of this surgical system.

FOS235
COMPARISON OF 3'-DEOXY-3'-[18F] FLUOROTHYMIDINE POSITRON EMISSION TOMOGRAPHY (FLT-PET) AND FDG-PET/CT FOR THE DETECTION AND CHARACTERIZATION OF PANCREATIC TUMORS

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Introduction: Despite recent advancements in clinical imaging modalities, differentiation of pancreatic masses remains difficult. Here, we tested the diagnostic accuracy of molecular based imaging using two different traces specific for cellular metabolism (FDG, radioactive glucose) and cellular division (FLT, radioactive thymidine) in patients with suspected pancreatic masses scheduled to undergo surgery.
Methods: 46 patients with pancreatic tumors suspicious for malignancy and scheduled for resective surgery have been recruited prospectively. In 41 patients, FLT-PET and FDG-PET/CT scans were performed. A diagnostic CT performed on a routine basis was available in 31 patients. FLT-PET and FDG-PET/CT emission images were acquired according to standard protocols. Tracer uptake in the tumor (FDG- and FLT-SUV) was quantified by region of interest (ROI) technique. For FDG-PET/CT analysis, correct ROI placement was ensured via side-by-side reading of corresponding CT images.
Results: 33 of 41 patients had malignancy, whereas 8 patients had benign disease. Visual analysis of FDG- and FLT-PET resulted in sensitivity values of 91% (30/33) and 70% (23/33), respectively. Corresponding specificities were 50% (4/8) for FDG-PET and 75% (6/8) for FLT-PET. In the subgroup of patients with contrast enhanced CT (n = 31), sensitivities were 96% (PET/CT), 88% (CT alone), 92% (FDG-PET) and 72% (FLT-PET) respectively. Mean FLT-uptake in all malignant tumors was 3.0 (range SUVmax, 1.1–6.5; mean FDG-SUVmax: 7.9, range, 3.3–17.8; $p < 0.001$).
Conclusion: For differentiation of pancreatic tumors, FDG-PET and FDG-PET/CT showed a higher sensitivity but lower specificity than FLT-PET.

FOS236
AUTOIMMUNE PANCREATITIS, A SINGLE CENTRE EXPERIENCE WITHIN THE UNITED KINGDOM

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Introduction: Autoimmune pancreatitis (AIP) was first reported in 1961, however was not described as a clinical entity until 1995. AIP is considered to have a favourable prognosis as patients usually respond well to corticosteroid therapy (CST). The natural history of AIP along with which patients require CST and for how long is only just beginning to be understood. We describe our experience of AIP and the potential role for steroid sparing agents.
Methods: Through a clinical database search, all patients who were treated at our institution for AIP between Jan 2005 and Dec 2011 were identified. 17 patients were identified, with 65% (n = 11) diagnosed and treated since September 2009. The diagnostic criteria, incidence of spontaneous resolution, AIP relapse and modality of treatment was assessed.
Results: 17 AIP patients, 82% (n = 14) male and 18% (n = 3) female. Median age 61 years. 88% (n = 15) jaundiced at presentation. 71% (n = 12) features of AIP on imaging and 59% (n = 10) raised IgG4. Extra-pancreatic manifestations in 65% (n = 11). AIP in 23% (n = 4) spontaneously resolved within six months. 65% (n = 11) were treated with CST, of these 64% (n = 7) presented with raised IgG4. Of those treated with CST, 36% (n = 4) subsequently relapsed, two while on low maintenance dose CST. All responded to a further course of CST and 75% (n = 3) were later converted onto steroid sparing agents. Of those initially treated with CST 54% (n = 6) have been converted onto steroid sparing agents and remain in remission with a median follow up of 12 months.
Conclusion: Spontaneous remission of AIP may be associated with a low future relapse rate. There is a potential role for steroid sparing agents in patients requiring longer term immunomodulation.

FOS237
RETROSPECTIVE COMPARISON OF MINIMALLY INVASIVE VERSUS OPEN PANCREATICODUODENECTOMY FOR PERIAMPULLARY NEOPLASMS

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Introduction: Surgical units are refining minimally invasive approaches to pancreaticoduodenectomy (MIPD) for periampullary neoplasms. Its complications, benefits, and

outcomes compared to open pancreaticoduodenectomy (OPD) have not been well-studied.

Methods: Outcomes were compared between patients with a preoperative diagnosis of periampullary neoplasm undergoing elective minimally invasive pancreaticoduodenectomy or open resection from November 2009 to July 2011 at a single institution. During this period, 28 MIPD and 28 OPD procedures were performed. There were 4 conversions to open which were included with the open group for analysis. Age, gender, and BMI between groups were similar. Pancreatic adenocarcinoma and non-invasive IPMN were the most frequent malignant and benign neoplasms, respectively, though there were more malignant pathologies in the open group (91% vs 67%, p = 0.04).

Results: Comparing MIPD to OPD, median procedure time was greater [444 minutes (range 340–628) vs 399 (190–621), p = 0.02]. Median lymph node harvest was less [15 (range 8–32) vs 19.5 (11–32), p = 0.002] while R0 resection rate was similar (75% vs 79%, p = 0.73). Complications were similar with respect to median length of stay [7.8 days (range 2–30) vs 8.1 (5–100), p = 0.45], pancreatic fistula rate of any grade (29% vs 34%, p = 0.68), delayed gastric emptying (16% vs 12%, p = 0.71), and 30-day readmission rates (25% vs 25%). There tended to be fewer surgical site infections (17% vs 41%, p = 0.05) and lower average daily oral morphine equivalents given during the first postoperative week (31.6 ± 27.1 vs 50.7 ± 49.1, p = 0.23).

Conclusion: MIPD and OPD offer comparable approaches to resecting periampullary tumors. Smaller though adequate lymph node yields with MIPD will need to be further studied for clinical significance. In line with other surgical procedures, the minimally invasive approach appears to be associated with fewer wound complications and less pain.

FOS238
PANCREATIC RESECTION AS A PART OF ENBLOC MULTIORGAN OPERATIONS FOR MALIGNANCIES

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Introduction: About 10% of all patients with colorectal cancer, up to 30% patients with gastric cancer and not rarely in other malignant tumors, the primary invention already discloses adhesions or infiltration of adjacent organs. En bloc resection of the primary cancer with adjacent organs is done to give patients a chance for curation, since intraoperative differentiation isn't possible. A review of patients with advanced abdominal malignancy, managed by multiorgan resection including pancreas is reported.

Methods: Inclusion criteria for the cohort of 16 reported patients were:

Multivisceral resection including pancreas. R0 en bloc resection. Malignant primary tumor or locally recurrent or metastatic cancer. Pancreatic involvement proved by histology.

Primary site of tumor was colorectal cancer in 6 cases, gastric cancer in 4 cases, liposarcoma in 3 cases, pancreatic cancer 1 patient, GIST in 1 patient and metastatic pulmonary cancer in 1 patient.

Results: In all patients multiorgan resections including pancreas were performed. Resections included en bloc proximal or distal resection of pancreas and/or with transverse colon, gastrectomy, resection of diafragm or kidney. Postoperative morbidity was 44% and mortality 6.2%.

Conclusion: In highly selected patients multivisceral operation including pancreatic resection for malignancy can be performed with acceptable morbidity and mortality.

Surgical resection may be an option for a curative approach, but in some cases it is only salvage operation.

FOS239
VASCULAR RESECTIONS – A FEASIBLE OPTION IN SURGICAL TREATMENT OF PANCREATIC CANCER

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Introduction: The incidence of pancreatic cancer is rising in all developed countries. It is the 7th leading cause for cancer related dead in Bulgaria. Surgery is the only potentially curative treatment for patients with pancreatic carcinoma, and multimodality therapy results in median survival of up to 34 months. Nowadays patients thought previously to be unresectable are undergoing R0 resections with satisfactory survival rates. This study aims to evaluate the effect of radical vascular resections.

Methods: Two hundred and nine consecutive patients with pancreatic cancer, radically operated in our department for a period of 6 years, were evaluated prospectively. Among them 169 underwent pancreaticoduodenectomies (48 classical Whipple's procedures and 121 PPPD) and the rest 40 – distal pancreatic resections (n = 29) or papillectomies (n = 11). Forty-three of the presented patients underwent pancreatic resection with simultaneous vascular resection – venous in 41 cases, arterial in 2, and combined in 3 cases. Twenty-three segmental and 18 partial wedge venous resections were done. Nineteen extended resections were made.

Results: The rate of postoperative morbidity was 33.9% (71 pts). A higher frequency of postoperative bleeding was observed in cases with vascular resection, especially in those who underwent reconstruction with artificial graft. Significantly improved long-term outcome was registered in patients who have overcome postoperative complications (p = 0.03). The 3-year survival rate of the radically operated patients was 22.5% versus 0 in these with palliative procedures. The data analysis revealed no statistically significant difference in the overall survival rate in patients who underwent resection of the portal vein (median survival 14.5 months) compared to that in patients with a standard pancreatoduodenal resection (17.1 months) – p = 0.5.

Conclusion: Resection should be as radical as possible, including portal vein or even arterial resections in selected cases. Radical surgery ensures better long-term results, anyway. Standardizing of the preoperative staging and the surgical approach and technique are the most important

details of the complex treatment of pancreatic cancer. We recommend this type of surgery to be concentrated in highly specialized centers in order to improve the outcome.

FOS240
MIDDLE-PRESERVING PANCREATECTOMY: INDICATIONS, TECHNIQUES AND OUTCOMES

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Introduction: Parenchyma-sparing pancreatectomy has gained increasing attention. Middle-preserving pancreatectomy (MPP) is a recently reported parenchyma-sparing procedure when the body of the pancreas is spared from pancreatic multicentric lesions. Due to its rarity, however, the role of this surgical procedure is not clearly defined. The aims of this study were to identify the indications to perform MPP and to evaluate the outcomes and quality of life of the patients who underwent this operation.

Methods: Firstly, authors reviewed their own experience with 2 cases of one-stage MPP; furthermore, a systematic review concerning MPP was carried on in English language medical literatures with a result of 17 cases of one-stage MPP and 3 cases of two-stage MPP have been gained. Patient characteristics, surgical techniques, histopathological findings, postoperative complications and prognosis of the 22 cases including ours were retrospectively analyzed.

Results: In 22 cases underwent MPP, 4 involved the whole gland and 18 spared the pancreatic body; 7 involved malignant lesions and 15 were benign or low malignant. The most common procedure of MPP consisted of pylorus preserving pancreatoduodenectomy and distal pancreatectomy (36.4%). Postoperative mortality was nil and postoperative morbidity was 9 (40.9%) including 5 pancreatic fistula, 2 intraperitoneal bleeding, 1 pseudocyst formation and 1 delayed gastric empty. At a median follow-up of 28 months, all are alive and disease-free except one died of malignant lymphoma; 4 (18.2%) developed insulin-dependent diabetes mellitus as well as exocrine insufficiency; 1 (4.5%) developed only diabetes mellitus; 1 (4.5%) developed only exocrine insufficiency.

Conclusion: MPP is a feasible parenchyma-sparing procedure that is indicated for selected patients and should always under the consideration of HPB surgeons. In treating multicentric pancreatic lesions that spare even a part of the pancreatic body, MPP may serves as an alternative since with it total pancreatectomy can be avoided and the risky of endocrine and exocrine insufficiency might be reduced.

FOS241
GASTROINTESTINAL BLEEDING RISK AFTER SPLEEN-PRESERVING DISTAL PANCREATECTOMY WITH EXCISION OF THE SPLENIC VESSELS: LONG-TERM FOLLOW-UP

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Introduction: Spleen-preserving distal pancreatectomy (SPDP) with excision of the splenic vessels (Warshaw operation) is a fast and effective procedure widely adopted on the basis of short-term studies. Splenic blood supply relies on the collateral vasculature via the short gastric and left gastroepiploic vessels. However, hemodynamic changes of splenogastric circulation may lead to the development of gastric varices with a risk of gastrointestinal bleeding.

Methods: The aim of this retrospective study was to assess the long-term postoperative clinical follow-up of these patients and to review the late postoperative imaging and results of those who underwent abdominal computed tomography (CT) or endoscopic examination during follow-up. From 1988 to 2010, 48 consecutive patients with benign or low-grade malignant disease underwent a Warshaw operation in our institution. Late postoperative follow-up was performed using a prospective database and was updated to December 2011. The imaging CT studies were reviewed by a single GI radiologist and the development of gastric varices (defined as tortuous veins larger than 5 mm) was systematically assessed.

Results: Median follow-up was 55 months (mean 70 months, range 2–286 months). Two patients were lost to follow-up. Gastrointestinal bleeding from gastric varices occurred in 1 patient only. Bleeding recurrence required subsequent splenectomy in this patient, more than 10 years after distal pancreatectomy. Endoscopy and abdominal CT showed submucosal gastric varices in this patient only. For the other 35 patients in whom postoperative abdominal CT were available, 15 patients had perigastric varices (43%) but none of them developed clinical complications from their varices.

All the perigastric varices occurred within 6 months after distal pancreatectomy and remained stable during follow-up.

Conclusion: This study confirmed that asymptomatic perigastric varices frequently occurred in patients who underwent spleen-preserving distal pancreatectomy with excision of the splenic vessels, but their bleeding risk seems to be very low. Abdominal CT can identify these perigastric venous pathways and may distinguish them from rare submucosal varices at higher risk of gastric bleeding.

FOS242

MYOCARDIAL ALTERATION IN EXPERIMENTAL ACUTE PANCREATITIS

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Introduction: Evidences suggest that proinflammatory cytokines (IL-1, TNF-α, IL-6 and IL-8) act as mediators of local and systemic manifestations in acute pancreatitis (AP) and correlate with the severity of the disease. The production in situ into the myocardium of pro-inflammatory cytokines may lead to acute myocardial damage with functional changes and, eventually, chronic sequelae. Evaluate the histological and functional changes of the heart in experimental acute pancreatits.

Methods: Adult Wistar rats were subjected to experimental acute pancreatitis induced by pancreatic duct infusion of Na-taurocholate. Myocardial function was evaluated by using echocardiography. Rats were sacrificed for biochemical and histological analysis and TGF-β, IL-6 and TNF-α gene expression study at 2, 12 and 24 hours and 15 days.

Echocardiography variables, cytokines, amylase and RNA expression were described with the use of summary measures (median, minimum and maximum) and compared using Kruskal-Wallis test followed by nonparametric multiple comparisons when there was a statistically significant correlation.

The histological measures were described using absolute and relative frequencies and compared using Kruskal-Wallis test.

Results: We observed decreasing in diastolic and systolic function and ventricular compliance in group 2 hours after acute pancreatitis. Induction of acute pancreatitis caused an increase in amylase and appearance of inflammatory mediators (TNF-α, IL-6 and IL-10). Twelve hours after induction of acute pancreatitis was not observed level of TNF-α in serum, however there was an increase in levels of IL-6 and decreased levels of IL-10 compared to 2 hours. Increased myocardial production of cytokines (TNF-α, IL-6, TGF-β) and myocardial histological lesions (vacuolar degeneration, pyknosis and loss of nuclei and lymphocytes) were associated with acute pancreatits.

Conclusion: We concluded that in acute pancreatitis there is myocardial damage probably related to in situ production of myocardial pro-inflammatory cytokines followed by the increasing TGF-β gene expression related to the occurrence of fibrosis and cellular repair.

FOS243

OUTCOMES OF MIDDLE PANCREATECTOMY: DOES ROBOTIC SURGERY HAVE ADVANTAGES OVER OPEN SURGERY?

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Introduction: Middle Pancreatectomy (MP) is a rational procedure in treating benign and low-grade malignant neoplasms in the neck and body of the pancreas. Laparoscopic MP has not been applied widely owing to the technical limitations. Robot was invented to overcome those deficiencies of traditional laparoscopic equipment. But information regarding the advantages of using the robotic system over open surgery for MP is rare. Therefore, a comparison of the outcomes between robotic MP and open MP was conducted.

Methods: Firstly, the authors retrospectively evaluated their initial experience with 7 consecutive cases underwent robotic MP (Group A). Furthermore, they compared the perioperative outcomes with open MP in 36 cases (Group B) performed in their institution.

Results: 5 females and 2 males were in Group A with a median age of 48.1 years (30~62 years), including 1 IPMNs and 6 serous cystadenoma. Median tumor size was 2.9 cm (0.5~5.0 cm). Pancreaticogastrostomy was performed in all cases. Median operation time was 216 min (150~330 min); median estimated intraoperative blood loss was 193 ml (50~400 ml). No transfusion was given during operations. 5 experienced postoperative pancreatic fistula (grade B), 1 experienced postpancreatectomy hemorrhage (grade B). No operative morality was noted. Compared to Group B, Group A demonstrated less intraoperative bleeding ($p < 0.05$), quicker recovery of gastrointestinal function ($p < 0.05$), higher postoperative pancreatic fistula and high postoperative complications ($p < 0.05$).

Conclusion: Robotic MP appears to be feasible and effective although it carries higher postoperative complications which were mainly due to limited experiences. Further experience beyond the learning curve phase may improve complication rate and more researches are needed to address the role of robotic MP in the advanced laparoscopic era. Robotic and open MP should be investigated in a randomized manner and long term outcomes should also be evaluated.

FOS244

INDICATORS FOR RESECTION OF INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS OF THE PANCREAS: DOES SIZE MATTER?

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Introduction:

Objective: To test the validity of the international consensus guidelines for management of Intraductal Papillary Mucinous Neoplasms (IPMN).

Summary Background Data: In 2006, consensus guidelines proposed resection of all main duct and mixed type IPMN, as well as branch duct IPMN associated with a mural nodule, symptoms, or size ≥3 cm.

Methods: From 1995 to 2011, 514 pancreatectomies for IPMN were identified through a prospective, single-institution database. Lesions were classified, based on preoperative imaging, as main duct if diffuse or segmental main pancreatic duct (MPD) dilatation ≥5 mm was present without associated dominant cystic lesion; branch duct if a cystic lesion was present without MPD dilatation; and mixed if a cystic lesion coexisted with MPD dilatation ≥5 mm.

Results: The incidence of invasive carcinoma and high-grade dysplasia was 67% and 13% in main-duct, and 42% and 22% in mixed type IPMN, supporting the recommendation for resection of such lesions. Branch duct IPMN harbored invasive carcinoma in 14% and high-grade dysplasia in 22% of cases. Specifically, branch duct IPMN with invasive carcinoma were larger more often symptomatic ($P < 0.001$), and more associated with a solid component on imaging ($P < 0.0001$) than those without invasive carcinoma. However, on multivariate analysis, the presence of a solid component ($P < 0.0001$) or symptoms ($P = 0.001$), but not size ≥3 cm ($P = 0.22$), were statistically significant independent predictors of invasive carcinoma.

Conclusion: In accordance with the consensus guidelines, IPMN involving the main pancreatic duct (main duct or mixed type), as well as branch duct IPMN with a solid component or symptoms have a strong association with malignancy and warrant surgical resection. In the absence of the above criteria, size ≥3 cm alone was not independently associated with malignancy in branch duct IPMN.

FOS245
PANCREATIC METASTASIS FROM RENAL CANCER CELL CARCINOMA – RESULTS OF SURGICAL MANAGEMENT

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Introduction: Metastatic tumors to the pancreas from renal cell carcinoma are uncommon.

Surgical resection seems to allow prolonged survivals. This was suggested through series of clinical cases in the surgical literature. Here we retrospectively analysed surgical and oncological data of a French clinical multicentric series.

Methods: A French multicentric register was performed by retrospective analysis of 60 patients undergoing pancreatic resection for renal cell carcinomas metastatic to the pancreas between May 1987 and June 2003. Interval from nephrectomy, clinical presentation, other metastatic sites, surgical resection, recurrences and survival were evaluated.

Results: All patients underwent radical nephrectomy. The median interval from nephrectomy to detection of pancreatic metastasis was 10 months (range 0 to 25) with 3 patients who presented synchronous metastasis. The pancreas was the first metastatic site in 82% of cases. In case of unique tumor (67%), the mean tumor size was 44 mm (range 10 to 250). Associated resection of extrapancreatic lesions was performed for 9 patients, including liver (n = 3), colon (n = 3) and adrenal gland (n = 3). During a median follow up of 46 months, 26 recurrences were observed 15 recurrences were identified in the liver (n = 13), pancreas (n = 7), kidney (n = 4) and lung (n = 7). The median overall survival and median recurrence free survival were respectively 46 and 23 months.

Conclusion: Renal cell carcinoma may be complicated by very late pancreatic metastasis. Extended clinical follow-up of patients with a medical history of RCC is recommended. An aggressive surgical management of single or multiple pancreatic metastasis, even in case of extrapancreatic disease, should be considered, and would provide a chance for long-term survival.

FOS246
USEFULNESS OF INTRAOPERATIVE CONTRAST ENHANCED ULTRASONOGRAPHY IN PANCREATIC SURGERY

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Introduction: Intraoperative contrast-enhanced ultrasonography (ICEUS) has been shown to be useful mainly for liver surgery. Computed tomography (CT), magnetic resonance imaging and other imaging modalities may not be accurate to clearly demonstrate tumor invasion. It is sometimes difficult to plan the optimal line of resection in pancreatic surgery. In this study, ICEUS for pancreatic tumors is evaluated.

Methods: We performed ICEUS in 20 patients with pancreatic surgery (11 carcinomas: n = 5-head, 6-body and tail), 4 intraductal papillary mucinous neoplasm (IPMN: n = 3-head, 1-head and body), 2 metastatic carcinomas (1-renal cell carcinoma, 1-lung cancer), 1 solid pseudo papillary neoplasm, and 1 neuroendocrine tumor (insulinoma). In 2 of 11 carcinomas (18%), 5 mm liver metastases were identified by ICEUS, and resection was avoided. In the remaining 9 carcinomas, the resection margin of the tumor was clearly confirmed by ICEUS.

Results: In one case of carcinoma in the head, the pancreas was divided 2 cm from the tumor and the surgical margin was negative. In another case of carcinoma in the body, the pancreas was divided 1 cm from the tumor and the surgical margin was pathologically positive. An additional 5 mm resection was necessary to obtain a negative surgical margin. In the remaining 7 cases, the surgical margin was negative

dividing the pancreas more than 2 cm from the tumor. In 4 IPMNs, papillary projections in the cystic lesion were enhanced by contrast-medium, but carcinoma could not be distinguished from an adenoma. One IPMN case was diagnosed as carcinoma in the final pathological report.

Conclusion: Although an insulinoma was shown as a poorly enhanced tumor on preoperative CT, it was well-enhanced by ICEUS as a typical insulinoma finding. ICEUS provided valuable information for pancreatic surgery, evaluation of the tumor, surgical margin and detection for small liver metastases not identified preoperatively. More than a 1.5 cm surgical margin from a pancreatic carcinoma is necessary to obtain a microscopically negative margin.

FOS247
PRESENCE OF PANCREATIC INTRAEPITHELIAL NEOPLASIA IN THE PANCREATIC TRANSECTION MARGIN DOES NOT INFLUENCE OUTCOME IN PATIENTS WITH R0 RESECTED PANCREATIC CANCER

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Introduction: Margin status is one of the strongest prognosticators after resection of pancreatic ductal adenocarcinoma (PDAC). The clinical significance of pancreatic intraepithelial neoplasia (PanIN) at a surgical margin has not been established.

Methods: A total of 208 patients who underwent R0 resection for PDAC between 2004 and 2008 were selected. Intraoperative frozen section slides containing the final pancreatic parenchymal transection margin were evaluated for presence or absence, number, and grade of PanINs. Data were compared to clinicopathologic factors, including patient survival.

Results: PanIN lesions were present in margins in 107 of 208 patients (51.4%). A total of 72 patients had PanIN-1 (34.6%), 44 had PanIN-2 (21.1%), and 16 had PanIN-3 (7.2%) at their margin. Overall median survival was 17.9 (95% confidence interval, 14–21.9) months. Neither the presence nor absence of PanIN nor histological grade had any significant correlation with important clinicopathologic characteristics. There were no significant survival differences between patients with or without PanIN lesions at the resection margin or among patients with PanIN-3 (carcinoma in situ) versus lower PanIN grades. However, patients with R1 resection had a significantly worse outcome compared with patients without invasive cancer at a margin.

Conclusion: The presence of PanINs at a resection margin does not affect survival in patients who undergo R0 resection for PDAC. These results have significant clinical implications for surgeons, because no additional resection seems to be indicated when intraoperative frozen sections reveal even high-grade PanIN lesions.

FOS248
NON-INVASIVE RADIOFREQUENCY IMPROVES ANTITUMOR EFFECT OF GEMCITABINE ON PANCREATIC TUMOR BY AUTOPHAGY

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Introduction: Chemotherapy based on the use of gemcitabine (GCB) for patients with pancreatic tumor has limited activity and needs further improvement. In this study we determined the feasibility of its combination with novel non-invasive and non-ionizing radiofrequency (RF) treatment in a mouse model of orthotopic pancreatic adenocarcinoma and evaluated the mechanism of action of this combination therapy.

Methods: In vitro, Panc-1 cells were treated with different doses of GCB with or without RF exposure and examined for cytotoxicity using an apoptosis kit for flow cytometry. In vivo, mice with established Panc-1 orthotopic pancreatic tumors were treated weekly with 70 mg/kg GCB i.p. with or without RF. Tumors were measured at the end of experiment. Vital organs were collected for histopathological analysis. The mechanism of the treatment was studied using immunohistochemical staining of tumor cells and tissues with antibodies against Ki-67, cleaved caspase 3, LC3B, and CD31 with VEGF for proliferation, apoptosis, autophagy and angiogenesis, respectively. Electron microscopy was used to determine morphological changes in tumor cells after treatment.

Results: Addition of RF treatment to GCB inhibited the growth of orthotopic Panc-1 tumor in mice, whereas single treatments showed no antitumor effect. Immunohistochemical analysis confirmed the decline of proliferating tumor cells in GCB + RF treated group versus groups receiving single treatment. No difference was noticed between treated groups after staining tumors for apoptosis and angiogenesis. Staining for autophagy revealed autophagosome formation in tumors receiving RF with the highest level in GCB + RF group. In vitro studies confirmed autophagosomes present in Panc-1 cells immediately after RF exposure, which was reversed after 48 h. Addition of subtoxic dose of GCB to RF prevented recovery of tumor cells from autophagy leading to their death.

Conclusion: Our study for the first time demonstrates the feasibility of adding new non-invasive RF treatment to the standard GCB-based chemotherapy for treating pancreatic cancer in situ. The treatment was well tolerated. The mechanism of action suggests autophagy induction in tumor cells after RF exposure. Without additional treatment tumor cells recover from RF-induced autophagy, however addition of GCB prevents this recovery, eventually leading to the death of tumor cells.

FOS249

INTERVENTIONAL RADIOLOGICAL MANAGEMENT OF PSEUDOANEURYSMS COMPLICATING PANCREATITIS

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Introduction: Pseudoaneurysms associated with pancreatitis are rare, and bleeding pseudoaneurysms have high associated mortality rates. The aim of this study was to evaluate the utilisation of endovascular embolisation and/or percutaneous thrombin injection in the management of pseudoaneurysms complicating pancreatitis.

Methods: Patients with pseudoaneurysms secondary to pancreatitis who underwent angiography between April 2005 and August 2011 were included. The medical notes were retrospectively reviewed. Twenty pseudoaneurysms measuring a median of 15 (7–80) mm in 13 patients were identified. The initial diagnosis was achieved on contrast computer tomography (CT, n = 4), CT angiogram (CTA, n = 7), duplex ultrasound (US, n = 1) and mesenteric angiogram (n = 1). The pseudoaneurysm was initially missed on the contrast CT of 3 patients and not visible for another 3 patients, one day before the correct diagnosis was made. All patients who had dedicated CTA had the correct diagnosis made.

Results: All 13 patients underwent mesenteric angiography. Coil embolisation was successful at first attempt for 7 patients (58%). The pseudoaneurysm had thrombosed spontaneously in one case and was technically inaccessible in another who subsequently underwent successful embolisation with percutaneous thrombin injection. Initial coil embolisation failed in 3 cases (25%); 2 patients had subsequent successful embolisation, and the third patient underwent percutaneous thrombin injection which also failed. There were no episodes of re-bleeding or cases of surgical intervention. The post procedure morbidity rate was 25% (n = 3) and mortality rate was 8% (n = 1, pulmonary embolus), after a median follow-up of 20 (2–31) months.

Conclusion: CTA is an accurate investigation for the diagnosis of pseudoaneurysms. Endovascular embolisation is a suitable first-line management strategy, and is associated with low re-bleeding rates.

FOS250

INDUCTION CHEMOTHERAPY FOLLOWED BY RADIATION THERAPY IS ASSOCIATED WITH BETTER SURVIVAL FOR PATIENTS WITH LOCALLY ADVANCED PANCREATIC CANCER

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Introduction: Advanced pancreatic cancer has a poor prognosis. At diagnosis, 80% of patients are unresectable; and among those unresectable, 40% of those are locally advanced. Currently, the standard treatment for locally advanced pancreatic cancer is not defined. We performed a retrospective analysis of patients treated at the Johns Hopkins Hospital (JHH) to assess the role of chemotherapy and radiation therapy for locally advanced pancreatic cancer.

Methods: A total of 1433 pancreatic cancer patients were seen at JHH between June 2006 and June 2010 and their medical records were reviewed. After excluding borderline resectable patients and patients who only had consultations at JHH, we identified 67 patients who met the Society of Surgical Oncology diagnostic criteria for locally advanced pancreatic cancer and who were treated primarily at JHH. Clinical information from diagnostic CT scans, chemotherapy and radiation therapy was collected. Overall survival (OS) and progression-free survival (PFS) were compared among different subgroups by Kaplan-Meier analysis. For the 67 patients (37% female, median age 62 y), median OS was 15.7 mo, median PFS 7.9 mo.

Results: Patients who received sequential treatment of full-dose chemotherapy and radiation had a longer PFS than those who received radiation alone (12.0 vs. 4.5 mo, $p < 0.01$) or those who received chemotherapy alone (12.0 vs. 6.8 mo, $p = 0.08$), but there was no difference in their OS. Among patients receiving both therapies sequentially, patients who received chemotherapy first had a significantly longer OS and a trend toward better PFS than patients who received radiation first (OS 18.1 vs. 11 mo, $p = 0.03$; PFS 12.6 vs. 8.3 mo, $p = 0.15$). Patients who received 3 or more cycles of chemotherapy prior to radiation had a trend for better OS than patients receiving less than three cycles of chemotherapy (17.6 vs. 14.6 mo, $p = 0.06$).

Conclusion: Although treatment course including both chemotherapy and radiation therapy is still favored, this study suggests that chemotherapy may play a more important role in the treatment of locally advanced pancreatic cancer. Our results support treating patients with induction chemotherapy for at least 3 cycles followed by consolidation with radiation therapy. These results need to be further validated in prospective clinical studies.

FOS251

FREY PROCEDURE IN PATIENTS WITH CHRONIC PANCREATITIS: SHORT AND LONG-TERM OUTCOME FROM A PROSPECTIVE STUDY

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Introduction: The aim of this prospective study was to analyze the short and long-term outcome of the Frey procedure in the treatment of chronic pancreatitis and to determine if the results endured after 5 years.

Methods: From September 2000 to November 2009, 44 consecutive patients underwent the Frey procedure. Patients were included in the study before surgery and followed prospectively at preset intervals with assessment of pain relief, weight gain and exocrine/endocrine insufficiency. Twenty-one patients (47.7%) were followed for longer than 5 years. This study included 40 men (91%) and 4 women (9%) (mean age of 49 ± 6.8 years) with a mean follow-up time of 51.5 months. The primary etiology of chronic pancreatitis was chronic alcohol abuse in 38 patients (86.4%). The major indication for surgery was disabling pain (95.5%).

Results: There was no postoperative mortality. Postoperative morbidity occurred in 15 patients (34.1%), with specific surgical complications in 11 patients (25%). The percentage of pain-free patients after surgery was 68.3%. Eight patients (18.1%) and 7 patients (16%) developed diabetes de novo and exocrine insufficiency, respectively. The Body Mass Index showed statistically significant improvement during follow-up ($p < 0.01$). Similar beneficial results concerning pain relief and weight gain persisted after the initial 5-year follow-up. A comparative subanalysis showed that endoscopic therapy was a predisposing factor for global, especially septic, complications ($p = 0.035$).

Conclusion: The Frey procedure is an appropriate, safe and effective technique for management of patients with chronic pancreatitis in the absence of neoplasia, based on short and long-term follow-up.

FOS252

EARLY NASOGASTRIC TUBE FEEDING VERSUS NIL-BY-MOUTH IN PATIENTS WITH MILD OR MODERATE ACUTE PANCREATITIS: A RANDOMIZED CONTROLLED TRIAL

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Introduction: Early enteral tube feeding reduces morbidity and mortality in patients with severe acute pancreatitis (AP) and is a standard of care. It is hypothesized that early enteral feeding in patients with mild and moderate AP would improve tolerance of subsequent oral refeeding, promote intestinal motility and reduce the incidence of ileus. The study aim was to compare the safety, tolerance and efficacy of early nasogastric tube feeding (NGF) versus NBM regimen in patients with mild and moderate AP.

Methods: A pilot randomized controlled trial in patients with mild and moderate AP was conducted between February 2010 and March 2011. The severity of AP was defined on the basis of determinants-based classification of severity [2]. The patients in the intervention group were NBM until NGF was commenced within 24 h of hospital admission and continued until the treating team decided to introduce oral food. The patients in the control group were kept NBM until the treating team decided to introduce oral food.

Results: There were 17 patients randomly allocated to NGF group and 18 to the NBM group. At baseline, the two groups did not have any significant differences in terms of demographic, anthropometric, and laboratory data. The visual analogue pain score decreased to a significantly greater extent in the NGF group (from median 9 (range 7–9) at baseline to 1 (0–3) at 72 h after randomization) compared with the NBM group (from 7 (5–9) to 3 (1–4) ($p = 0.036$). The number of patients not requiring opiates at 48 hours was significantly different ($p = 0.024$) between NGF (9/17) and NBM (3/18). Oral feeding intolerance was observed in 1/17 patient in the ETF group and 9/18 patients in the NBM group ($p = 0.004$).

Conclusion: NGF commenced within 24 h of hospital admission is safe and well tolerated in patients with mild and moderate acute pancreatitis. Further, when compared with NBM, it significantly reduces the intensity and duration of initial abdominal pain, need for opiates, and risk of oral refeeding intolerance.

FOS253

EVALUATION OF CT ACCURACY TO DETERMINE RESECTABILITY OF PANCREATIC HEAD ADENOCARCINOMA AFTER NEOADJUVANT RADIO-CHEMOTHERAPY

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Introduction: To evaluate the accuracy of CT scan for determination of resectability R0 after neoadjuvant therapy in patients with pancreatic head adenocarcinoma locally advanced.

Methods: From January 2005 to December 2010, 80 patients with pancreatic head adenocarcinoma underwent multidetector CT before surgery. Of these, 38 patients received neoadjuvant therapy because tumor was considered locally advanced on baseline CT scan. We retrospectively correlated imaging interpretations with operative and histological data and compared results in patients without (control group) or with (neoadjuvant group) preoperative treatment.

Results: 41/42 patients in control group and 31/38 patients in neoadjuvant group finally had curative resection. While resection R0 is similar in both groups (83% and 81%), CT

accuracy in determining resectability R0 was significantly decreased in neoadjuvant group (58% versus 83%). CT scan specificity was significantly lower after neoadjuvant therapy (52% versus 88% in control group) due to an overestimation of vascular invasion: 12/31 patients with complete resection in neoadjuvant group were evaluated at high risk of incomplete resection on CT scan. Tumor size tends to be underestimated in control group (−2 mm) and overestimated in neoadjuvant group (+10 mm). T-staging accuracy was decreased in neoadjuvant group (39% versus 78% in control group).

Conclusion: Neoadjuvant therapy significantly decreases the accuracy of CT scan in determining T-staging and resectability R0 of pancreatic head carcinoma. Overestimation of tumor size and vascular invasion significantly reduces CT scan specificity after preoperative treatment.

FOS254
SUPERIOR MESENTERIC VEIN (SMV) MARGIN POSITIVITY IN RESECTABLE PANCREATIC CANCER CORRELATES WITH HIGH SUPERIOR MESENTERIC ARTERY (SMA) MARGIN POSITIVITY; IS VEIN RESECTION ADVISABLE?

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Introduction: The purpose of this study was to examine the hypothesis that patients undergoing pancreaticoduodenectomy (PD) for resectable pancreatic adenocarcinoma with positive SMV margin have a high rate of SMA positivity. If true, this would question the rationale for clearing the SMV margin with vein resection if the SMA margin will remain affected.

Methods: A pancreatic cancer database was reviewed to identify a single surgeon's pancreaticoduodenctomies (PD) for pancreatic adenocarcinoma that are deemed resectable by NCCN guidelines. All patients had pancreatic protocol CT scans, Ca 19-9 levels and endoscopic ultrasound as possible. The patient's characteristics, operative parameters and morbidity/mortality were analyzed. Pathologic inking of PD specimen was performed with 4 colors to identify and specifically study the SMV and SMA margins.

Results: 97 patients underwent PD for resectable adenocarcinoma. Of the 97 patients, 20 patients had SMV positive margins (20.6%). Of these, 9 patients had positive SMA margins (45%). Comparing the SMA positive versus SMA negative margin groups who had SMV positivity, there was significance in operative time suggestive of a more complex operation; 4.24 ± 0.70 hours for SMA positive and 3.6 ± 0.68 hours for SMA negative ($p < 0.05$).

Conclusion: In resectable pancreatic cancer, there is still a high rate of SMV positivity. In our series this is nearly 20%, with 45% of these patients having additional SMA positivity. This suggests that vein resection is futile in these cases and that preoperative therapy may be necessary for this disease despite determined radiological and clinical parameters suggestive of resectability.

FOS255
PARENCHYMA-SPARING PANCREATECTOMY FOR PANCREATIC ENDOCRINE TUMORS

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Introduction: Pancreas-sparing pancreatectomy (PSP), including enucleation and central pancreatectomy, has been investigated as an alternative to standard resection (SR) for pancreatic endocrine neoplasm, but the benefit-risk of these procedures remain little-known.

Methods: From 1998 to 2010, among 197 patients operated for well-differentiated pancreatic endocrine tumors, 67 underwent PSP (22 central pancreatectomies and 45 enucleations) and 66 SR (35 pancreaticoduodenectomies and 31 distal pancreatectomies) for tumor below 4 cm in size, without synchronous distant metastasis. Groups were compared regarding postoperative morbidity, mortality, long-term pancreatic function, and survival calculated by the Kaplan Meier method.

Results: Tumors resected by PSP had a median size of 15 mm, were mainly incidentally diagnosed (n = 46, 69%), and non-functioning (n = 55, 82%). Overall morbidity rate was higher after PSP than SR (76% vs 58%, p = 0.003), including more frequent pancreatic fistulas (69% vs 42%, p = 0.003). Postoperative diabetes was less frequent following PSP than pancreaticoduodenectomy (5% vs 21%; p = 0.02) without any difference compared to distal pancreatectomy (p = 0.58). Exocrine insufficiency was significantly less frequent after PSP than SR (2% vs 32%; p < 0.0001). The overall and recurrence-free 5-year survival for patient with non-functioning tumors resected by PSP were 96% and 98% respectively.

Conclusion: In selected patients, with small and low-grade tumors, PSP is associated with an excellent postoperative pancreatic function, overall and recurrence-free survival, despite an increased postoperative morbidity. PSP should be considered as a valid option for treatment of selected well-differentiated pancreatic endocrine tumors.

FOS256

NUTRITIONAL SUPPORT AFTER PANCREATICODUODENECTOMY: NASOJEJUNAL, JEJUNOSTOMY OR PARENTERAL FEEDING?

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Introduction: European nutritional guidelines recommend routine use of enteral feeding after pancreaticoduodenectomy (PD) whereas American guidelines do not. Data on the efficacy and, especially, complications of the various feeding strategies after PD are scarce. The aim of this study was to compare the efficacy and complications of routine feeding after PD by nasojejunal tube (NJT), jejunostomy tube (JT) or total parenteral nutrition (TPN).

Methods: We performed a retrospective monocenter cohort study in 144 consecutive patients who underwent PD during a period wherein the routine post-PD feeding strategy changed twice. Patients not receiving nutritional support (n = 15) were excluded. Complications were graded according to the Clavien-Dindo classification and the International Study Group of Pancreatic Surgery (ISGPS) definitions. Analysis was by intention-to-treat. Primary endpoint was the time to resumption of normal oral intake (TRNI).

Results: 129 patients undergoing PD were included (NJT = 44, JT = 48, TPN = 37). Groups were comparable with respect to baseline characteristics, Clavien > I complications, in-hospital stay and mortality. There were no differences in TRNI (NJT/JT/TPN: median 13, 16 and 14 days, P = 0.15) and incidence of delayed gastric emptying (P = 0.30). Tube related complications occurred mainly in the NJT-group (34% dislodgement). In the JT-group, relaparotomy was performed in three patients because of JT-leakage or strangulation leading to death in one patient. Wound infections were most common in the TPN group (NJT/JT/TPN: 16%, 6% and 30%, P = 0.02). A multivariable logistic regression analysis showed no difference between the strategies in morbidity or mortality.

Conclusion: None of the analysed feeding strategies was found superior with respect to TRNI, morbidity and mortality. Each strategy was associated with specific complications. Nasojejunal tubes dislodged in a third of patients, jejunostomy tubes caused few but potentially life-threatening bowel strangulation and TPN doubled the risk of infections. Future studies should address the value of a postoperative oral diet without nutritional support, preferably in an enhanced-recovery setting.

FOS257

GRANULOCYTE MACROPHAGE COLONY STIMULATING FACTOR (GM-CSF) PANCREAS TUMOR VACCINE IN COMBINATION WITH BLOCKADE OF PD-1 IN A PRECLINICAL MODEL OF PANCREATIC CANCER

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Introduction: Our phase I/II human clinical trials utilizing a GM-CSF secreting allogeneic pancreas tumor vaccine (GVAX) have been shown to be safe and effective in inducing anti-tumor immune response in pancreatic adenocarcinoma patients. GVAX treated patients have demonstrated infiltration of PD-1+ T cells which is a major immunosuppressive mechanism in the tumor microenvironment. We hypothesized that the use of a PD-1 blocking antibody and GVAX will improve vaccine therapy and pancreatic cancer survival.

Methods: Mice were orthotopically transplanted with 2 × 106 Panc02 pancreatic tumor cells to form liver metastases by a hemisplenectomy technique on day 0. Following tumor transplantation, wild-type or PD-1 knockout mice were treated subcutaneously with a mouse GM-CSF secreting pancreatic tumor vaccine (mouse GVAX) in combination with anti-PD-1 antibodies or IgG isotype control. GVAX was given subcutaneously to mice on days 4, 7, 14, and 21 following tumor transplantation, together with a single low-dose of Cytoxan on day 3. Anti-PD-1 antibodies or IgG were administered twice weekly starting post-operative day 3.

Results: PD-1 knockout mice challenged with pancreatic liver metastases had a significant survival advantage over wild-type mice ($p = 0.0002$). Wild-type mice showed improved survival both with anti-PD-1 antibody alone ($p = 0.008$) or in combination with vaccine ($p < 0.0001$) versus IgG controls. GVAX in combination with anti-PD-1 antibodies versus anti-PD-1 antibodies alone shows a statistically significant improved survival ($p < 0.05$).

Conclusion: PD-1 blockade through monoclonal antibodies or genetic knockout in combination with vaccine result in a synergistic anti-tumor effect in a preclinical model of pancreatic cancer versus treatment with PD1 alone. Anti-PD-1 blockade antibody is currently being tested in phase II clinical trials for treating chemotherapy-refractory solid tumor patients. Our study provides a strong rationale for combining PD-1 antibody with GVAX therapy for pancreatic cancer treatment.

FOS258

STUDY OF THE DEGREE OF TUMOR REGRESSION IN RESECTED ADENOCARCINOMA OF PANCREAS FOLLOWING A NEOADJUVANT TREATMENT (GEMCITABINE AND ABRAXANE). PREDICTIVE VALUE OF THE ENDOSONOGRAPHIC ELASTOGRAPHY

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Introduction: Mean patient survival after surgery of adenocarcinoma of pancreas range from 12 to 20 months. Neo adjuvant chemo-radiotherapy has not increased yet this overall survival rate; furthermore it is still controversial if radiotherapy improves pancreas resecability.

These poor results of neo adjuvant treatment could be due to the fact that the tissular area around pancreas cancer reduces adsorption of the anti tumoral drug. Endoscopic ultrasound can measure the thickness of pancreas tissue. It has been proved, on experimental surgical model of pancreas cancer, that overall mouse survival using gemcitabine alone or in combination with nab-placlitaxel (abraxane) increase form 60% to 100% respectively. Nowadays, this protocol has been approved for the treatment of metastasic pancreas cancer.

This essay provide our preliminary survival results of a prospective trial study in which patients with resecable cancer pancreas have been treated with a neo adjuvant combination of Gemcitabine and Abraxane. Primary endpoints are: to show the tumor regression rate (TRR) after resection (Ryan escale) and to find its relation with the tumor tissue elastography before and after the neo adjuvant treatment (VET).

Methods: We included prospectively 15 patients from March 2011 to December 2011. Untill now 7 patients underwent surgery, one patient had sistemical progression of malignancy after treatment and 7 patients are waiting for surgery.

Results: The anatomo pathological results of the 7 specimen are: 1 well differentiate neuroendocrine tumor; 5 adenocarcinoma; 1 pan IN-2.

TRR/ %VET: case 1: TRR: 3 / VET: 70% of decrease; Case 2: TRR: 1 / VET: unchanged; Case 3: TRR: 1/ VET: 62% of increase; Case 4: GRT: 1 / VET: unchanged; Caso 5: TRR: 1 / VET: 75% of decrease.

Conclusion: Neo adjuvant treatment combination of Gemcitabine and Abraxane showed efficacy on 80% of the resected patients. Elastography measure of the tissue tumor during neo adjuvant treatment was not predictive of TRR. It has to be define if this good pathological response will be ratify by overall survival rate increase.

FOS259

OUTCOME OF A SHORT TERM CHEMOTHERAPY IN STAGE III PANCREATIC CARCINOMA: A SELECTION FOR LOCAL ABLATIVE TREATMENT?

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Introduction: Systemic chemotherapy (CHT) with neoadiuvant intent in stage III pancreatic cancer (PC) aims to achieve resecability in CHT responders patients. Same stage of disease can be treated with a local ablative therapy (RFA). In our series of RFA done as first treatment we observed 15% of early progression and therefore those patients could not take advantage from a local therapy. We aim to evaluate the effect of a short CHT in stage III PC to identify those patients eligible for RFA.

Methods: All patients with a diagnosis of Stage III ductal carcinoma were eligible for the study. In all cases stadiation was obtained by CT scan or MRI and CEUS. They were all sent to oncologist with a planned re-evaluation after 3 months of CHT chosen by the oncologist. Re-staging was performed with CT scan and Ca19.9 serum marker. Local or systemic progression, stable disease or partial response were the three possible event. Depending on re-staging each patient was addressed to the most appropriate treatment: surgical exploration for resection or RFA, CHT or palliative medical therapy.

Results: 65 patients met the requested criteria. Forty-two pts received venous CHT. Three pts died during therapy. After 3 months 45% of pts had progression of disease (local in 25% and distant in 20%); 31% had stable disease and 18% had radiological downstaging. RFA was performed in 65% of patients with stable disease and in 30% of patients with downstaging whereas resection was conducted in 6% and 50% of the two groups respectively. All patients who received RFA were then treated CHT and external RT. Median survival of CHT responders undergone to RFA is 19 months (IQR 15.75–20.75) and at this time 29% of them are alive with controlled disease 19 months after diagnosis. No early progressions were observed in this subgroup of patients.

Conclusion: A short term CHT may help to identify those patients who can benefit of a local ablative treatment. In our series of patients we observed a high rate of early progression within 3 months after RFA due to aggressive biology of disease of occulted micrometastasis: these patients could not benefit from local ablation. On the other side, the CHT responders who underwent RFA showed a favorable prognosis, 19 months survival, significantly higher than data reported in literature for same stage of disease.

FOS260

MODIFIED DPPHR (DUODENUM-PRESERVING RESECTION OF THE HEAD OF THE PANCREAS) FOR THE LOW GRADE MALIGNANT LESION IN THE PANCREAS HEAD

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Introduction: We have been conducting DPPHR for the low grade malignant lesion located in the pancreatic head. However higher postoperative complications such as pancreatic fistula are concerned. To avoid these complications we have recently modified DPPHR, resecting total parenchyma of the pancreatic head including groove area. The aim of this study was to investigate outcomes in terms of postoperative complications and disease control.

Methods: 21 patients underwent DPPHR between 1994 and 2011. Of them we retrospectively divided patients into two groups, conventional DPPHR group (cDPPHR) which includes the patients who underwent incomplete pancreatic parenchymal resection and modified DPPHR group (mDPPHR). We statistically compared these 2 groups regarding for the perioperative factors, especially those related to the postoperative complications.

Results: 21 patients consisted of 15 intraductal papillary mucinous neoplasms, 2 endocrine tumors, 2 serous cystic neoplasms and others. The median age was 61 (23–77) years and median follow up period was 51 months. There was statistically no significant difference between these 2 groups in the operation time. However intra-operative blood loss and period of hospital stay was significantly smaller in the mDPPHR. The rate of clinically relevant pancreas related complications remarkably decreased after technical modification compared with that of the previous period (7/8 (88%) in cDPPHR and 2/13 (15%) in mDPPHR, P = 0.0022). The postoperative mortality rate was 0% in both groups. For the neoplastic lesions, surgical margin was negative in all cases.

Conclusion: For the low grade malignant lesion, modified DPPHR may provide clinical benefits of significant radicality and less invasiveness at the same time.

FOS261

EXPRESSION OF B-CATENIN AND AXIN-1 IN SOLID PSEUDOPAPILLARY NEOPLASMS OF THE PANCREAS

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Introduction: Solid pseudopapillary neoplasm (SPN) is a distinct pancreatic neoplasm and has characteristic, aberrant nuclear expression of Beta-catenin in most cases. However, alterations in components of the Wnt pathway, other than the Bate-catenin (CTNNB1) gene mutation, have not been identified. In this study, we investigated the status of Axin-1, the spectrum of mutations in the CTNNB1 gene, and the clinicopathological features of SPNs.

Methods: We collected 27 SPNs from 25 patients. A tissue microarray was constructed to perform immunohistochemistry for Bate-catenin, E-cadherin, and Axin-1. The CTNNB1 and AXIN1 gene mutations were analyzed by DNA sequencing. Finally, the clinicopathological features of SPNs were analyzed for association with the CTNNB1 mutations and the Axin-1 alterations.

Results: All 27 SPNs expressed nuclear immunoreactivity of Bate-catenin and exhibited a lack of membranous decoration of E-cadherin. All SPNs harbored CTNNB1 gene mutations. No alterations were present in the AXIN1 gene, and the immunohistochemical analysis revealed weak or absent reactivity of Axin-1 in the cytosol. All cases with a codon-37 CTNNB1 mutation had weak Axin-1 immunoreactivity in the cytoplasm (P = 0.018).

Conclusion: Nuclear Bate-catenin immunoexpression is characteristic for SPNs and corresponds to the CTNNB1 mutation. The Wnt pathway is involved in the tumorigenesis of SPNs, primarily through the alteration of Bate-catenin. Despite the absence of any identifiable genetic mutation, a low level of Axin-1 in the cytoplasm might contribute to the aberrant distribution of Bate-catenin in SPNs.

FOS262

ENHANCED RECOVERY AFTER PANCREATIC SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: In the past decade Enhanced Recovery After Surgery (ERAS) protocols have been implemented in several fields of surgery. With these protocols, a faster recovery and shorter hospital stay can be accomplished without an increase in morbidity or mortality. The aim of this study was to systematically review the evidence for implementation of an ERAS protocol in pancreatic surgery.

Methods: A systematic search was performed in Medline, Embase, Pubmed, CINAHL and the Cochrane library for papers describing an ERAS programme in adult patients undergoing elective pancreatic surgery published between January 1966 and December 2010. The primary and secondary outcome measures were postoperative length of stay, overall post-operative complication rates, re-admissions and mortality. Subsequently a meta-analysis of outcome measures was conducted. This systematic review and meta-analysis was performed according to the PRISMA statement.

Results: Seven out of 152 papers met the predefined inclusion criteria. Only two of the studies reported data on discharge criteria and assessed time to recovery and return to normal function. Implementation of an ERAS protocol led in four out of five comparative studies to a significant decrease in length of stay. Meta-analysis showed there was a significant difference in complication rates in favour of the ERAS group (risk difference 9.8%, 95% CI 3.8–15.9). Introduction of an ERAS protocol did not result in an increase in mortality. Delayed gastric emptying and incidence of

pancreatic fistula did not differ significantly between groups. All studies reporting on hospital costs showed a decrease after implementation of ERAS.

Conclusion: This systematic review and meta-analysis shows a shorter hospital stay can be achieved by using an ERAS protocol in pancreatic surgery without compromising morbidity and mortality. Data on discharge criteria and recovery to normal function are lacking in most of the studies.

FOS263
THE IMPACT OF MFG-E8 IN CHRONIC PANCREATITIS: POTENTIAL TARGET FOR FUTURE IMMUNOTHERAPY?

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Introduction: The glycoprotein MFG-E8 mediates phagocytic clearance of apoptotic cells and influences the pathogenesis and progression of inflammatory diseases. MFG-E8 was shown to attenuate the progression of inflammation and improved survival in septic rats. Accumulating evidence suggests an immunomodulatory link between MFG-E8 and the pro-inflammatory chemokine fractalkine, which may determine the severity of pain, fibrosis, and inflammation in chronic pancreatitis (CP).

Methods: The expression and localization of MFG-E8 was investigated in CP (n = 67), and normal pancreas (NP; n = 34) by QRT-PCR, Western-blot and immunohistochemistry analyses. Results were correlated with mRNA expression of fractalkine, CX3CR1, and with the degree of pain and fibrosis. Human pancreatic stellate cells (hPSCs) were isolated from CP tissues and evaluated for MFG-E8 mRNA expression after fractalkine stimulation.

Results: MFG-E8-mRNA was significantly overexpressed in CP and isolated hPSCs when compared to NP. Western-blot and immunohistochemistry analysis confirmed accumulation of MFG-E8 in chronic pancreatitis with noticeably increased MFG-E8 immunoreactivity in tubular complexes and inflammatory cells. MFG-E8 expression correlated significantly with fractalkine expression, the degree of fibrosis, and the severity of pain in CP patients. Stimulation of hPSCs with fractalkine lead to a significant increase in MFG-E8 expression.

Conclusion: We demonstrated for the first time that MFG-E8 is significantly up-regulated in CP patients. Together with fractalkine it correlated with the degree of fibrosis and the severity of pain. hPSCs overexpress MFG-E8 upon fractalkine stimulation, which may be a key mechanism in CP fibrogenesis and pain generation. These novel findings demonstrate that MFG-E8 blockade seems to be a promising tool for future immunotherapy in CP to attenuate both severity of fibrosis and pain.

FOS264
RELATIONSHIP BETWEEN R0 RESECTION AND TUMOR CHARACTERISTICS VERSUS VOLUME OF PANCREATICODUODENECTOMY IN A NATIONWIDE PATHOLOGY DATABASE

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Introduction: It has been shown that centers with a high volume of pancreaticoduodenectomies (PD) have improved postoperative outcome and increased survival. The prolonged survival may be partially explained by higher R0 resection rates in high volume centers, but in contrast, these centers are supposed to operate more advanced tumors.

Methods: The pathology reports of all PD's (n = 1877) carried out in the period 2004–2009 for malignant and premalignant tumors in the Netherlands were collected from a nationwide pathology database (PALGA). The year of surgery, histology, radicality, tumor diameter and differentiation were collected. R0 resection was defined as tumor negative resection margins. Centers were classified as high volume if they performed at least 20 PD's per year (2009: n = 9 high volume, n = 23 low volume). The primary endpoints were the relationship between R0 resection and tumor characteristics versus operation volume. Secondary endpoints were trends in time and quality of pathology reports.

Results: In high volume centers, more R0 resections were obtained in patients with pancreatic head tumors (55% vs 48%, P = 0.04) and, in all tumor types, more T3/T4 tumors (65% vs 54%, P = 0.001) and more poorly differentiated tumors (31% vs 25% P = 0.001) were operated.

In the period 2004–2009, the number of PD's performed for malignant tumors increased by nearly 50% (from 274 to 409). This trend can be explained partly by an increase in the number of T3/T4 tumors operated in high volume centers (73% in 2009 vs 60% in 2004, P = 0.03) without an increase in low volume centers. Pathology reports of low volume centers more often lacked essential data such as tumor stage (24% vs 14%, P = 0.001) and tumor diameter (26% vs. 19%, P = 0.001).

Conclusion: High volume centers achieved higher rates of R0 resections although they resected more advanced tumors. Essential data were more often missing in pathology reports from low volume centers. Pathology reports should be standardized to minimize the risk of missing data. The 50% increase in PD's performed in the Netherlands in recent years is partly explained by an increase in resections for T3/T4 tumors in high volume centers.

FOS265

PANCREATIC ADENOCARCINOMAS ARISING ON THE BACKGROUND OF PANCREATIC CYSTIC DISEASE HAVE A BETTER OUTCOME THAN POOR OUTCOME

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Introduction: Pancreatic adenocarinoma has a poor prognosis with a reported 5-year survival of <5%, however, this general figure does not differentiate ductal adenocarcinoma from adenocarcinomas arising within a background of pancreatic cystic disease. The aim of this study was to report long-term survival rates in patients with ductal adenocarcinoma and compare them to carcinomas arising in cystic disease and to those originating from the endocrine pancreas.

Methods: Frequency and follow-up data was obtained from The National Cancer Institute's Surveillance, Epidemiology, End Results (SEER) database for the period 1973–2006. The survival of patients with ductal adenocarcinoma (ICD [International classification of disease] codes: 8010, 8140–8147, 8500) were compared to: adenocarcinoma in IPMN (ICD: 8453); mucinous cystadenocarcinoma (ICD: 8470–8471); endocrine/islet cell carcinoma (8240–8249, 8150–8157); and mucinous adenocarcinoma 8480–8481). Carcinomas classified as malignant neoplasms and those of other histopathological subtypes were excluded.

Results: During the period February 1998 to December 2008, 127,295 patients were identified of which 111,714 were within the remit of the study. Adequate data to perform survival analysis was available for 92,911 cases. 5-yr Survival for carcinomas arising in IPMN carcinomas (44%) and mucinous cystadenocarcinomas (34.1%) were superior to that of standard adenocarcinomas (2.3%) or mucinous adenocarcinomas (2.8%) [p<0.001] for each, with survival of carcinomas of endocrine origin being similar to that of cystic lesion carcinomas (36.7%) [p = 0.38].

Conclusion: It is evident that survival of patients with carcinoma arising in this setting is superior and thus all patients with a mucinous cystic neoplasm should be referred for a surgical opinion.

FOS266

TOTALLY ISOLATED ROUX-EN-Y RECONSTRUCTION AFTER PANCREATICODUODENECTOMY: FIRST RESULTS OF THE SINGLE CENTER RANDOMISED TRIAL

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Introduction: Pancreaticoduodenectomy is associated with a high rate of postoperative complications and morbidity. Pancreatic anastomotic failure remains among the most common and potentially lethal postoperative complications of pancreaticoduodenectomy. Use of a Roux-en-Y loop for reconstruction of pancreatic drainage is a technique that has been suggested to reduce pancreatic anastomotic leakage related morbidity and mortality in patients undergoing pancreaticoduodenectomy.

Methods: A randomizing trial was started in 2009 and now involving 34 patients who underwent pancreatic head resections. Reconstruction of the pancreatic remnant was done using a single loop (SL) in 15 patients and by an original technique – totally isolated Roux-en-Y loop`s (TIR) in 19 patients. Our reconstructive method aims at a complete separation of passage of gastric contents, bile and pancreatic juice. Thus we prevent any types of possible refluxes and related complications (pancreatic leakage, cholangitis, Â gastric ulceration). All pancreatic anastomosis were performed as a duct to mucosa anastomosis, in two layers, without pancreatic stent. Pancreatic fistula was defined as drainage of greater than 50 ml of amylase fluid on or after day 5.

Results: TIR was associated with a reduction of the incidence of pancreatic anastomotic leak (SL, 31.8%; TIR, 15.7%; $p < 0.05$), reduction of the required postoperative interventional radiology procedures (SL, 22.7%; TIR, 5.2%; $p > 0.05$). There is no incidents of postoperative cholangitis in TIR group (SL, 22.7%). Developed technique was accompanied by slight prolongation of the operative time (SL, 4.40 ± 1.20 h; TIR, 4.10 ± 1.11 h).

Conclusion: We found that TIR is associated with a reduction in morbidity after pancreaticoduodenectomy for pancreatic adenocarcinoma compared with SL. Results at the beginning of the study are very promising.

FOS267

IMPORTANCE OF HISTOLOGICAL SUBTYPING OF PERIAMPULLARY CANCER

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Introduction: The term periampullary carcinoma is used for a heterogeneous group of tumors that are often difficult to classify with certainty. Another alternative is to classify periampullary tumours based on morphologic criteria and certain immunohistochemical (IHC) markers on histology into intestinal (I) or pancreatobiliary (PB) types. I type tumours have been shown to have favorable prognosis compared to PB type. We aimed to study these histologic subtypes and their clinicopathological correlation.

Methods: All patients (n = 109) with periampullary adenocarcinoma who underwent pancreaticoduodenectomy over a 3 year period were the subjects of the study (ampullary – 83.4%, pancreas – 8.2%, bile duct – 5.5% and duodenal adenocarcinoma – 2.7%). Two experienced pathologists histologically classified into I, PB and other types initially based on microscopic morphological criteria only. Then the same patients were reclassified based on combination of microscopic morphology and immunohistochemical markers (CDX2, MUC2, MUC1 and CK17). These groups were then correlated with various clinicopathological factors to ascertain the value of each classification using Chi square and Kaplan Meir tests.

Results: Using microscopic morphologic criteria, 42 & 54 cases were classified as I & PB type respectively. Upon reclassification using a combination of IHC and microscopic morphological criteria, 48 cases were classified as I type and 50 cases as PB type. Using morphologic classification, I type were of a lower grade (81%), lesser stage (90% stage I & II), had a lower incidence of perineural (19%) and lymphovascular invasion (4.7%) and nodal metastasis (31%). Reclassification of cases did not make any difference to the correlation to these factors. However, classification without using IHC showed a better difference in median survival (I and PB type – 30 and 13 months, p = 0.03) than reclassification using IHC (I and PB types – 28 and 16 months, p = 0.15).

Conclusion: Periampullary carcinoma can be classified into intestinal and pancreatobiliary types using microscopic morphologic criteria. This shows a good correlation with clinicopathologic factors and survival. Intestinal type cases have a better prognosis and survival. In the present study, immunohistochemical staining does not add much to the classification and its role needs to be studied further.

FOS268
NATIONWIDE HOSPITAL MORTALITY AFTER PANCREATIC RESECTION

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Introduction: High-volume hospitals were reported to have better outcome after pancreatic resection. This study was performed to analyze volume-outcome relationship after pancreatic resection for periampullary, pancreatic, and peripancreatic tumors in Korea using the nationwide database.

Methods: We retrospectively analyzed 6,836 patients who underwent pancreatic resection including pancreaticoduodenectomy (PD) between Jan. 2005 and Dec. 2008 from database of the Health Insurance Review and Assessment Service. Total 145 participating hospitals were divided into quintiles: very-low, low, medium, high, and very-high. Hospital mortality, which was defined as death during the hospital stay for pancreatic resection, was used as quality indicator. Several risk factors were analyzed for hospital mortality. Adjusted hospital mortality was calculated by adjusting confounder factors through multivariate logistic regression.

Results: The overall hospital mortality after pancreatic resection was 2.2% in Korea. The observed hospital mortality of each volume category, ranging from 0.7% to 4.6%, showed significant volume-outcome relationship after pancreatic resection (P < 0.001). This mortality was also higher in the medical aid group (P = 0.018) and in the classical PD patients (P < 0.001). Average age of mortality group was higher than that of the other survived patients (P < 0.001). Through multivariate logistic regression, only hospital surgical volume and age were proved to be independent factors for hospital mortality. The adjusted hospital mortality rates showed similar difference with the observed mortality rates between volume categories.

Conclusion: The higher-volume hospitals were clarified to show lower hospital mortality after pancreatic resection for periampullary, pancreatic, and peripancreatic tumors through nationwide database. The overall hospital mortality was 2.2% and hospital volume and age were independent risk factors for hospital death.

FOS269
PATTERN AND CLINICAL PREDICTORS OF LYMPH NODE INVOLVEMENT IN PANCREATIC NEUROENDOCRINE TUMORS (PANNETS)

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Introduction: Pancreatic neuroendocrine tumors (PanNETs) are often indolent neoplasms without pathological lymph node (LN) metastasis (pN1). Therefore, in patients with low risk of pN1, surgery can be limited and lymphadenectomy could be avoided. The aim of the study was to construct a model for predicting the risk of pN1 prior to surgical resection.

Methods: The combined prospective databases from the Surgical Department of the University of Verona and the Beaujon Hospital were queried. Clinical and pathological data of all patients with resected (R0 or R1), pathologically confirmed nonfunctioning PanNET between 1993 and 2009 were retrospectively reviewed. Multiple logistic regression analysis was performed.

Results: Data were analyzed for 194 patients. Metastases were present in the dissected LNs of 58 patients (30%). The 5-year disease free survival for patients with pN1 was significantly lower than for those without nodal metastases (66% vs 93%, P < 0.0001). Multivariable analysis suggested the significant independent factors associated with pN1 were radiological nodal status (rN) (odds ratio [OR] 5.01, P < 0.0001) and the degree of differentiation (G2 vs G1 OR 4.44, P = 0.001) (first model). Overall, the 94% of patients with rN0 PanNET-G1 were pN0. When the degree of differentiation was excluded, the radiological size >4 cm (OR 2.5, P = 0.012) was an independent predictor of pN1 (second model).

Conclusion: Patients with PanNET-G1, in the absence of radiological node involvement, have a very low risk of pN1. When a preoperative cytological diagnosis is not achieved, the radiological size of the lesion is a powerful alternative predictor of pN1. The analysis demonstrates that the risk of pathological nodal involvement in PanNET patients can be estimated by a clinical predictive model.

FOS270

LONG-TERM OUTCOMES OF PANCREATICODUODENECTOMY IN PATIENTS WITH PERIAMPULLARY ADENOCARCINOMA

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Introduction: Periampullary tumors include carcinomas of the pancreatic head, distal bile duct, duodenum and ampulla of Vater. All these tumors were treated with pancreticoduodenectomy in general. As a prognostic factor of these tumors, perineural growth and lymph node ratio have been discussed recently. We investigated the long-term outcomes and prognostic factors including perineural growth and lymph node ratio in patients with carcinomas of different sites treated with the same surgical procedure.

Methods: Between January 1998 and December 2008, a total of 406 patients with periampullary adenocarcinoma underwent pancreaticoduodenectomy at our institution. Data of these patients were retrieved from our prospective database. Their clinicopathological data (age, gender, tumor location, preoperative biliary stent, pylorus preservation, tumor size, differentiation, lymph node metastases, lymph node ratio, pancreas invasion, perineural growth, vascular invasion, lymphatic invasion, residual tumor status) were reviewed and analyzed in a multivariate analyses.

Results: There were 258 patients with pancreatic head carcinoma, 60 with distal bile duct carcinoma, 28 with duodenal carcinoma, and 60 with ampullary carcinoma. Median follow-up time was 26 months. The overall 5-year survival rate was 22.3%, 51.7%, 65.9%, and 73.4%, respectively. The 30-day mortality rate was 0.5% (n = 2). Patients with pancreatic head carcinoma had significantly poorer survival compared with the other three carcinomas ($p < 0.001$). In multivariate analyses of three carcinomas except for pancreatic head carcinoma, lymph node ratio >0.1 ($p = 0.0057$), pancreas invasion ($p = 0.0445$), and positive surgical margin ($p = 0.0432$) were independent predictors for poor survival. Location of the primary site was not a significant factor.

Conclusion: Pancreatic head carcinoma had the worst prognosis among 4 tumors of periampullary lesion. The other three tumors such as distal bile duct carcinoma, duodenal carcinoma, and ampullary carcinoma had comparatively better prognosis. Among these three tumors, not the tumor location but lymph node ratio, pancreas invasion, and residual tumor status would be a useful predictor for survival.

FOS271

ROBOT-ASSISTED PANCREATIC SURGERY: A SYSTEMATIC REVIEW OF THE LITERATURE

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Introduction: Pancreatic surgery is technically demanding. To potentially improve outcome, robot-assisted pancreatic surgery has been introduced. Robot-assisted surgery has possible advantages over laparoscopic surgery, such as 3-dimensional vision and increased freedom of instruments. Several centers have now adopted robot-assisted pancreatic surgery. We performed the first systematic review to assess the safety and feasibility of robot-assisted pancreatic surgery.

Methods: We systematically reviewed the literature published up to September 30th 2011, according to the PRISMA guidelines. Only studies reporting a cohort of at least 5 patients undergoing robot-assisted pancreatic surgery were included. Exclusion criteria were review articles, animal studies, and conference abstracts. Data on baseline characteristics, details of the procedures and clinical outcomes were extracted and analyzed.

Results: After screening 499 studies, 9 series, reporting on 260 patients undergoing robot-assisted pancreatic surgery, were included. All were retrospective observational cohort studies. Types of resection included pancreaticoduodenectomies (PD) (n = 131) and distal pancreatectomies (n = 85). Average operation time ranged from 236 to 719 minutes (420–719 minutes for PD only) and average blood loss from 20 to 372 millilitres. 10% of the robotically started operations were converted to open surgery (17% for PD). Morbidity was 30%, mainly pancreatic leaks (21% of all patients). Mortality was 1.5%. Average hospital stay ranged from 4 to 22 days. Five series (n = 127) reported on surgical margin status; negative margins were obtained in 93% of the patients.

Conclusion: Robot-assisted pancreatic surgery seems to be safe and feasible in selected patients. Future studies should report long term oncological outcomes and compare robot-assisted pancreatic surgery with laparoscopic and open resections.

FOS272

NEURAL REMODELLING IN PANCREATIC NEUROPATHY IS CHARACTERIZED BY INCREASED UNMYELINATED NERVE FIBER CONTENT AND SELECTIVE GLIAL ACTIVATION

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Introduction: Pancreatic neuropathy in pancreatic adenoarcinoma (PCa) and chronic pancreatitis (CP) is associated with decreased sympathetic innervation of the pancreas and neural remodelling. To complete the characterization of pancreatic neuropathy the degree of myelination and glia content were investigated in intrapancreatic nerves in PCa and CP.

Methods: Intrapancreatic nerves of patients with PCa (n = 20), CP (n = 20) and normal human pancreas (n = 10) were immunolabelled with the neural myelination marker neurofilament-H (NFH), and the glial activation markers Glial-Fibrillary-Acidic-Protein (GFAP) und p75 receptor (p75NTR). The neural immunoreactivity of each marker was correlated to the neuropathic pain sensation, the degree of neural invasion (NI) in PCa and to the degree of pancreatic neuritis in PCa and CP.

Results: PCa, and not CP, is associated with decreased neural immunoreactivity of GFAP, p75 and NFH. PCa patients with pain possess even less GFAP and NFH in their intrapancreatic nerves when compared to those without pain. Intrapancreatic nerves with increasing degree of pancreatic neuritis in PCa and NI harbour higher amounts of NFH and p75. Contrastingly, pancreatic neuritis in CP is mostly encountered around nerves with small NFH content.

Conclusion: PCa is associated with increased appearance of unmyelinated intrapancreatic nerve fibers and a relative decrease of glia cells. However, pancreatic neuritis and NI in PCa are directed towards myelinated nerve fibers which are accompanied by activated glia cells. Therefore, pancreatic neuropathy in PCa induces a selective, non-global, glial activation and the dominance of unmyelinated and thus pain-transmitting intrapancreatic nerve fibers.

FOS273
GOLD NANOPARTICLES FOR APPLICATIONS IN NON-INVASIVE RADIOFREQUENCY HYPERTHERMIA FOR PANCREATIC AND HEPATOCELLULAR CARCINOMA TREATMENT

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Introduction: We are applying full-body penetrating radiofrequency (RF) electromagnetic waves to liver and pancreatic cancer cells that have internalized gold nanoparticles (AuNPs), which upon irradiation, heat up and destroy cancer by thermal ablation or hyperthermia. Thermal cytotoxicity could be enhanced by intracellular pH modulation using lysosomotropic agents. AuNP heat production was also shown to be dependent on NP size, concentration and surface area.

Methods: Antibody-conjugated (C225) AuNPs targeted pancreatic (Panc-1) and liver (Hep3B, SNU449) cancer cells that express varying amounts of EGFR. Cell viability was measured using MTT assays and FACS with Annexin-V and PI assays. Intracellular pH was measured using fluorescence ratios of FITC-labeled C225-AuNPs. Intracellular pH was modulated using concanamycin A, chloroquine, or NH4Cl. Protein denaturation was analyzed using recombinant human lentivirus expressing green fluorescent protein together with firefly luciferase. Heating was performed using our 600 W RF system operating at 13.56 MHz. AuNP-RF dynamics were analyzed using complex permittivity measurements across the range 10 MHz to 3 GHz.

Results: All cell lines selectively internalized C225-AuNPs through receptor-mediated endocytosis, with the NPs predominantly accumulating and aggregating within cytoplasmic endo-lysosomes. After exposure to an external RF field, non-aggregated AuNPs absorbed and dissipated energy as heat causing thermal damage to the targeted cancer cells. We observed that RF absorption and heat dissipation is dependent on solubility of AuNPs in the colloid, which is pH dependent. Furthermore, by modulating endo-lysosomal pH it is possible to prevent intracellular AuNP aggregation and enhance thermal cytotoxicity in pancreatic and hepatocellular cancer cells. Heat production was only measured for NPs of diameters 5 and 10 nm indicating unique nanoscale phenomenon.

Conclusion: Contrary to previous publications AuNPs heat when exposed to an RF field in a size-, surface-, and concentration-dependent manner. By conjugating AuNPs to targeting antibodies such as Cetuximab, pancreatic and hepatocellular cancer cells were able to selectively internalize these NPs through receptor-mediated endocytosis. Thermal cytotoxicity could be greatly enhanced by raising the intracellular pH. This nano-mediated RF technology is a viable candidate for alternative cancer therapy.

FOS274
INTRAPERITONEAL GEMCITABINE FOR RESECTABLE PANCREATIC CARCINOMA: EARLY DATA FROM A PHASE II STUDY

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Introduction: Pancreatic cancer patients have a dismal prognosis and long term survival is rare even after R0 resection. Recurrences most commonly involve the local regional area, the peritoneal surface and the liver. Intraperitoneal chemotherapy provides a pharmacological advantage that may reduce the incidence of recurrence following curative resection. The aim of this exploratory Phase I/II study is to evaluate the safety of intraperitoneal gemcitabine used at the time of pancreatic cancer resection.

Methods: This is an ongoing prospective single-institution Phase 2 study for patients with resectable adenocarcinoma of the pancreas. Patients undergoing standard surgical resections for pancreatic cancer are treated with 1000 mg/m^2 of intraperitoneal gemcitabine heated to 42 C for 60 minutes immediately following tumor resection and prior to creating the anastomoses. Peritoneal fluid, plasma and urine samples are taken every 15 minutes during gemcitabine administration and analyzed using HPLC. All morbidity is prospectively recorded using the Common Toxicity Criteria for the first 30 postoperative days.

Results: Seven patients have been enrolled to date and all had a pancreaticoduodenectomy. Intraperitoneal gemcitabine was administered in all 7 patients as planned. Minor morbidity was observed in 4 patients: one grade 2 neurologic event, one grade 2 neutropenia, one grade 2 urinary tract infection and one grade 2 arrythmia. One patient had a grade 3 pancreatic fistula requiring percutaneous drainage. There were no returns to the operating room. The mean postoperative length of stay was 14 days (range 9–21). Pharmacologic analysis showed a favorable peritoneal to plasma AUC ratio for gemcitabine ranging from 210 to 368. At the end of 60 minutes, 43–68% of the drug is systemically absorbed. The peak plasma level averages 2.81 mcg/mL.

Conclusion: The preliminary analysis of early data from our study shows acceptable morbidity following intraoperative intraperitoneal gemcitabine. The pharmacologic analysis confirms a high peritoneal to plasma AUC ratio for gemcitabine exposing the surfaces at risk for recurrence to high levels of gemcitabine. Continued enrollment into the study and follow-up with analysis of 2-year survival outcomes will

be done. Future studies may include multi-drug intraperitoneal chemotherapy regimens.

FOS275
THE IMPACT OF MARGINS STATUS ON NATURAL COURSE AND RECURRENCE RATES FOLLOWING PANCREATECTOMY FOR IPMN

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Introduction: Significance of microscopic margins involvement on natural course and recurrence rates following resection of IPMN are incompletely defined.
Methods: Cohort analysis. The extent of resection was defined by the working diagnosis (IPMN vs. cancer and IPMN) and the imaging (CT or MRCP and EUS). Margins assessment (frozen section, FS) was not routine. Follow-up includes an annual EUS or CT. Outcome measures includes rates of R1 resections, IPMN and/or cancer recurrence, need for re-pancreatectomy and overall survival.
Results: 91 patients (IPMN only, n = 48; cancer and IPMN, 43) are included. The rate of margins positivity in the IPMN group was 34% (50% when FS was performed vs. 31% when not). Recurrences in the remnant pancreas were of IPMN in one case (1/35, 3%) and of invasive cancer in 2/35 (6%). Mean follow-up is 64 mo. (8–147). There was no correlation between margins positivity or the degree of dysplasia and late recurrences.

Margins involvement with IPMN was found in 18% and with invasive cancer in 26% in the IPMN/cancer group. Local recurrence with cancer was 51% and with IPMN, 0%. Mean follow-up is 25 mo. (2–124).
Conclusion: Defining the extent of resection for IPMN according to the pre-operative imaging is practical and safe. Intra-operative FS assessment does not ensure R0 resection and R1 resection does not directly affect macroscopic recurrence. The incidence of cancer in the remnant pancreas following partial pancreatectomy for "benign" IPMN is 6%! "Preventive" surgery (total pancreatectomy) for cancer and background IPMN is not justified since prognosis is dictated by the cancer and IPMN recurrence.

FOS276
A NEW METHOD OF POLYPROPYLENE MESH-REINFORCED PANCREATICOJEJUNOSTOMY (PANCREATICOGASTROSTOMY): A CLINICAL STUDY OF 60 CASES

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Introduction: To evaluate the effect and safety of polypropylene mesh-reinforced pancreaticojejunostomy (pancreaticogastrostomy).
Methods: A series of 60 consecutive patients with pancreatic or peri-ampullar tumor (pancreatic carcinoma 13 cases, pancreatic cystadenoma 6 cases, distal bile duct carcinoma 29 cases, papillary carcinoma 9 cases, papillary adenoma 2 cases, duodenal malignant stromal tumor 1 case) underwent procedures of pancreticoduodenectomy. The Child's method was used in the present study for alimentary tract reconstruction. Fifty-four cases underwent polyprolene mesh-reinforced pancreaticojejunostomy and 6 cases underwent polyprolene mesh-reinforced pancreaticogastrostomy.
Results: The mean operative time for polyprolene mesh-reinforced pancreaticojejunostomy (pancreaticogastrostomy) was 25 min (range 22–35 min). Anastomoses of pancreaticojejunostomy (pancreaticogastrostomy) were measured for tolerance pressure during operation and all cases could tolerate a pressure of 25 cm H_2O. Post-operative pancreatic fistula was occurred in 7 cases (11.7%) (grade A: 4 cases, grade B: 3 cases). No massive hemorrhage occurred in the present series and there was no postoperative mortality. Mean post-operative hospital stay was 12 days (range 9–16 days).
Conclusion: Polyprolene mesh-reinforced pancreaticojejunostomy (pancreaticogastrostomy) is an appropriate procedure for alimentary tract reconstruction in pancreticoduodenectomy.

FOS277
EPITHELIAL-MESENCHYMAL TRANSITION IN AMPULLARY CANCER

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Introduction: Ampullary cancer is a relatively rare disease and can frequently be treated by surgical resection. There are two main subtypes, intestinal and pancreatobiliary. Invasion and metastasis of cancer cells has been shown to be promoted by the activation of the 'epithelial to mesenchymal transition' (EMT) program. ZEB1 (zinc finger E-box binding homeobox 1) is an activator of EMT and cancer stem cell properties.
Methods: We studied the occurrence and mechanisms of EMT in ampullary carcinoma using immuno-histochemical analysis from human tissue samples and two established human ampullary carcinoma cell lines. For in vitro characterization, expression of EMT and tumor subtype markers, cell growth and inhibition by chemotherapy, matrigel transmigration and tumor sphere formation were employed with two pancreatic cancer cell lines serving as controls.
Results: Immunohistochemical (IHC) analysis of human ampullary cancer tissue showed lymph node metastasis to be associated with tumor budding and loss of CDX2 expression, associated with the pancreatobiliary phenotype. Overall, the degree of EMT was only moderate. The two ampullary cancer cell lines displayed a strong EMT phenotype, evidenced by spindle form cell shape, diffuse colony growth pattern, high ZEB1 and Vimentin expression, low levels of E-Cadherin and micro-RNA 200c and strong matrigel transmigration. The intestinal subtype marker CK20 was expressed in all cell lines including pancreatic cancer cell lines, but CDX2 expression was only found at very low levels.

Conclusion: Invasion and metastasis of ampullary cancer are associated with EMT. The pancreatobiliary type of ampullary cancer displays more signs of EMT than the intestinal type. High ZEB1 expression levels could not be found in human tumor tissue, but in vitro experiments show that EMT in ampullary cancer cell lines is regulated by ZEB1.

FOS278
A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL ON USE OF OCTREOTIDE IN PATIENTS WITH SOFT PANCREAS UNDERGOING PANCREATICODUODENECTOMY: INTERIM ANALYSIS

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Introduction: Pancreatic fistula is one of the major reasons for morbidity following pancreatoduodenectomy. Beneficial role of octreotide in preventing pancreatic fistula is not clearly proven and it is believed that it may be beneficial in soft glands and normal sized ducts. This prospective randomized open label trial aims to assess the role of octreotide in decreasing pancreatic fistulae, postoperative complications, morbidity and hospital stay in patients with soft pancreas compared with no octreotide.

Methods: Random selection method was used to allocate patients with soft pancreas undergoing pancreaticoduodenectomy patients to octreotide group – 100 mcg subcutaneously 8 hourly for 5 days (Group 1) versus no octreotide group (Group 2). Inclusion criteria were elective surgery patients undergoing pancreatoduodenectomy for periampullary cancer, pancreatic cancer with soft pancreas and non-dilated duct. Postoperative outcome was assessed in detail.

Results: At interim analysis, there were 24 patients in Group 1 and 21 in Group 2. Demographic features of both groups were matching. The pancreatic duct diameter were 3.75 and 3.38 mms (p = ns) in Groups 1 and 2 respectively. The pancreatic fistulae in Groups 1 & 2 were: Grade A: 14 (58.3%) & 11 (47.6%), Grade B: 3 (12.5%) & 4 (19.5%) and Grade C: 1 (4%) & 1 (4.7%) respectively (p = ns). The drain amylase values on 3rd postoperative day (POD3) were 3615.7 ± 5205.2 and 1558.05 ± 2403.6 U/L (p = ns) in Groups 1 & 2. The drain volume on POD3 were 113.3 ± 181.7 versus 64.84 ± 94.93 ml respectively (p = ns) in Groups 1 & 2. Patients in Group 1& 2 were resumed on oral liquids on 7 ± 3.8 versus 8.8 ± 4.5 days and semisolid 11.2 ± 3.8 versus 13 ± 5.2 days (p = ns). The 30 day morbidity in Groups 1 & 2 were similar, 7 (29.1%) versus 7 (38.1%) (p = ns); the hospital stay were also similar 12.7 ± 3.9 versus 14.8 ± 5.3 days (p = ns) respectively.

Conclusion: Interim analysis of this randomized trial on use of octreotide following pancreaticoduodenectomy in those patients with soft pancreas shows no significant decrease in pancreatic fistulae, morbidity or hospital stay.

FOS279
POSTOPERATIVE INFECTIOUS COMPLICATION IS A POOR PROGNOSTIC FACTOR IN PERIAMPULLARY CANCER FOLLOWING PANCREATICODUODENECTOMY

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Introduction: The clinical significance of the presence of postoperative complication on the prognosis of periampullary cancer after pancreaticoduodenectomy (PD) is unclear.

Methods: Clinical data of consecutive 200 patients with periampullary cancer received a PD between October 2003 and July 2010 were reviewed and survival analysis was performed. Postoperative complications were classified according to a modification of Clavien's classification. Overall 86 major complications ≥grade II occurred in 71 patients. Patients were classified to two groups according to the postoperative complications ≥grade II: Group C-, absence of complication (n = 129); Group C+, presence of complication (n = 71).

Results: There was no difference in the sex, mean age, TNM stage, biliary drainage, type of resection and radicality between two groups (P > 0.05). The 3 year overall and disease-free survival rates of Group C+ patients (31.0% and 22.3%) were significantly lower than those of Group C– patients (49.0% and 40.0%; P = 0.003 and 0.002, respectively). The multivariate analysis showed postoperative complication (P = 0.001), T stage of T3 or T4 (P = 0.001), positive node metastasis (P = 0.001), R1 or R2 resection (P = 0.023), and angiolymphatic invasion (P = 0.013) were independent prognostic factors for disease-free survival. In Group C+, systemic recurrence occurred more frequently in group Cx+ than those in Group C (P = 0.025).

Conclusion: There was no difference in the sex, mean age, TNM stage, biliary drainage, type of resection and radicality between two groups (P > 0.05).

FOS280
MARKED VENOUS INFILTRATION MAY LEAD TO EARLY RELAPSE OF ADENOSQUAMOUS CARCINOMA OF THE PANCREAS

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Introduction: Adenosquamous carcinoma (ASC) of the pancreas is a rare subtype of pancreatic cancer, with a dismal prognosis. We describe the clinicopathological features of surgically resected ASC of the pancreas in order to elucidate the cause of aggressive behavior.

Methods: From 2001 to 2011, 132 patients underwent R0 resection for stage IIA or IIB pancreatic cancer. Survival rate, pathological features and recurrent status were reviewed.

Results: Out of 132 patients, 121 patients had tubular adenocarcinoma, whereas only 7 patients had adenosquamous carcinoma (ASC). The incident rate of ASC increased according to the enlargement of tumor size. The overall survival and disease free survival periods of the patients with ASC were significantly shorter ($p = 0.0153$ and $p = 0.0045$). Histological findings revealed marked venous invasion in ASC compared to any other subtypes of tubular adenocarcinoma (G1, G2 and G3). The proportions of v3, which denotes the most severe venous invasion, were 31.3% in G1, 47.3% in G2, 60.0% in G3 and 71.4% in ASC, respectively. The occurrence of distant metastases was more frequent in ASC compared to that in tubular adenocarcinoma (50% versus 34%).

Conclusion: Adenosquamous carcinoma (ASC) develops as a consequence of late diagnosis. Marked venous invasion of ASC may lead to early relapse, especially in distant lesions, resulting in poor prognosis. To improve the surgical outcome, early detection and elucidation of the aggressive mechanisms are needed.

FOS281
SPLEEN-PRESERVING DISTAL PANCREATECTOMY WITH OR WITHOUT SPLEEN VESSELS EXCISION

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Introduction: Spleen-preserving during distal pancreatectomy (DP) for benign or border-line neoplasms of the pancreas has been proposed to reduce the complications of splenectomy. A simplified technique for spleen preservation with excision of the splenic artery and vein has been reported (Warshaw's operation). However, the risk of gastric varices and subsequent bleeding has been suggested. Aim of this study was to evaluate our experience of spleen-preserving DP with or without splenic vessels excision.

Methods: From January 1990 to December 2009, 61 consecutive patients with benign or low grade malignant pancreatic disease underwent spleen-preserving DP: 35 with splenic vessels preservation (group A) and 26 with splenic vessels excision (group B). Postoperative course and long-term results were analyzed and compared in both groups of patients.

Results: There was 8 cystic neoplasms, 8 IPMN and 19 endocrine neoplasms in the group A compared to 14 cystic tumors, 3 IPMN and 19 endocrine tumors in group B.

There was no operative mortality. Complications (mainly grade A and B pancreatic fistula) occurred in 11 group A patients (31%) vs 8 (30%) in group B patients. 1 patients in group A and 2 in group B experienced partial splenic infarction that resolved with conservative treatment. After a median follow-up of 72 months (range 24–252) no tumor's recurrence was found. Only one patient (group B) showed CT and endoscopic evidence of gastric varices, but episodes of gastrointestinal bleeding never occurred.

Conclusion: Splenic preservation during distal pancreatectomy is a feasible and safe procedure. The occurrence of perigastric varices and the relative risk of bleeding after spleen-preserving distal pancreatectomy with splenic vessels excision appear to be overestimated. Excision of splenic vessels is a fast and effective method to perform a spleen-preserving left pancreatectomy.

FOS282
THE CLINICAL IMPACT OF LYMPH NODE RATIO AS A PROGNOSTIC FACTOR AFTER RESECTION OF PANCREATIC CANCER

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Introduction: The ratio between metastatic and dissected lymph nodes (LN ratio) has been identified as an independent prognostic factor in the treatment of the gastric, breast, and colon cancer patients with similar prognosis. The aim of this study was to investigate whether the LN ratio is a useful predictor of surgical outcomes in patients with pancreatic ductal carcinoma.

Methods: The clinical records of 56 patients that underwent macroscopic curative pancreatectomy for pancreatic adenocarcinoma between January 2001 and December 2009 were reviewed retrospectively. Thirty-seven patients were underwent pancreaticoduodenectomy, 16 underwent distal pancreatectomy, and 3 underwent total pancreatectomy, respectively. Nineteen clinicopathologic factors, including the number of the lymph node metastasis, the number of dissected lymph nodes, N category according to the Japanese pancreatic society (JPS) classification, and the LN ratio, were analyzed using univariate and multivariate analyses in these patients.

Results: The overall 5-year survival rate was 26.9%, and median survival time was 23.2 months. Multivariate survival analysis showed that positive surgical margin ($p = 0.027$) and LN ratio ≥ 0.2 ($p = 0.025$) were independently associated with a poorer prognosis. With regard to the subgroup analysis among the 33 patients with lymph node metastasis, there were significant differences in the survival rates between patients with LN ratio ≥ 0.3 and LN ratio < 0.3 (MST 13.0 vs. 25.1 months, $p = 0.01$), however, the differences in survival between N1 and N2 in JPS classification are not statistically significant (MST 25.1 vs. 21.2 months, $p = 0.98$).

Conclusion: Our results suggested that the LN ratio might be more useful than the number of the lymph node metastasis, the number of dissected lymph nodes, and N category according to the JPS classification as a predictor for survival after pancreatectomy in patients with invasive ductal carcinoma of the pancreas.

FOS283
LAPAROSCOPIC DISTAL PANCREATIC RESECTIONS: PANCREATIC FISTULA IS INVERSELY PROPORTIONAL TO THE LENGTH OF THE RESECTED DISTAL PANCREAS

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Introduction: Although the risk of diabetes is proportionally related to the length of resected distal pancreas, the risk of pancreatic fistula (PF) is not well know. Our aim was to compare the rate of pancreatic fistulas according to the resected specimen length performed by laparoscopy.
Methods: From January 2008 to December 2011, 51 laparoscopic distal pancreatectomies (LDP) were performed and studied from a unicentric prospective maintained database, including 28 (42.3%) distal pancreatectomies with section on the neck (Long Specimen: length of the resected specimen was ≥12 cm), including associated splenectomy in 22 (78.6%) and 23 distal pancreatectomies with section on the body or tail (Short Specimen: length of the resected specimen was <12 cm). Section was done by stapler (Ethicon EC 60®). The rate and gravity of PF were compared between the Long Specimen (LS) and Short Specimen (SS) groups.
Results: There was no difference regarding mean age (54.7 and 51.3 years old), sex ratio (F/M = 43% vs 70%) and body mass index (25.6 kg/m² vs 25.9 kg/m²). The mean length of resected pancreas in the LS group was 12.8 cm versus 8 cm in the SS group ($p < 0.001$). Resection for cancer was more frequent in LS group (7 patients vs 0). The fistula rate was significantly higher (50% vs 78%; $p = 0.038$) in the SS group. There was no difference in the gravity of PF between the groups LS and SS: 9 (65%) and 13 (73%) patients with grade A, 3 (21%) and 4 (22%) patients with grade B, and 2 (14%) and 1 (5%) patients with grade C. The duration of PF was similar (26.6 vs 38.8 days; $p = 0.16$). The mean duration of hospital stay was 17.8 vs 19.33 days, respectively ($p = 0.6$).
Conclusion: Unlike diabetes, the rate of pancreatic fistula is inversely proportional to the length of laparoscopic resected pancreas and is balanced with a low rate of diabetes, justifying a reappraisal of the section technique and not the section level. This information should be given to patients who will undergo small pancreatic resections for benign disease.

FOS284
EFFICACY OF MULTIMODAL PROGRAM "FAST TRACK SURGERY" IN THE SURGICAL TREATMENT FOR PANCREATIC CANCER PATIENTS

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Introduction: Recent developments in the pancreatic surgery are the introduction and implementation of multimodal fast track recovery programs. The aim of the study was to evaluate the results of a fast-track surgery (FTS) for pancreatic cancer patients.
Methods: The randomized controlled single center study was conceived to determine efficacy of FTS and standard care (SC) in patients having pancretoduodenal resection for pancreatic cancer. The regimen FTS contained: no preoperative bowel cleansing, transverse and small abdominal incisions, no tubes, mobilization and consumption of clear carbohydrate rich fluid until two hours before surgery, epidural analgesia, oral laxatives. Intraoperative fluid administration was restricted, oral food intake started on the day of surgery with clear fluids and was increased to a small amount of solid food on day 1 after surgery. Complete enteral nutrition was initiated on day 2 after surgery following opaque media examination of the upper gastrointestinal tract.
Results: 21 patients with II-III stage of pancreatic cancer were included (11 FTS group vs. 10 SC group). The rates of pancreatic fistula and other intra-abdominal complications were similar in the two groups. Delayed gastric emptying was significantly reduced in the fast-track group (9 vs. 30 per cent). We detected a significantly faster return of first bowel movement (median 12 h vs. 48 h). Length of stay was reduced with the fast-track protocol (median 10 vs. 16 days).
Conclusion: Patients undergoing fast-track rehabilitation suffer from less pain and have a faster return of gastrointestinal function in the postoperative course and recover faster. In addition, postoperative length of hospital stay was significantly shorter in fast-track patients.

FOS285
THORACIC EPIDURAL ANAESTHESIA MODULATES INFLAMMATORY RESPONSE AND DECREASES THE SEVERITY OF ACUTE PANCREATITIS IN PIGS

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Introduction: Sympathetic nervous system (SNS) is important in the early neurogenic inflammatory response. Severity of acute pancreatitis (AP) is determined by development of systemic inflammatory response. In experimental settings, thoracic epidural anaesthesia (TEA) improved pancreatic and hepatic microcirculation during AP in rats. We investigated whether TEA modulates inflammatory response by SNS blockade, improves local metabolic parameters and decreases the severity of AP in pigs.
Methods: Anaesthetized normoventilated pigs were allocated into three groups (G), eight in each one. G1 = AP, G2 = AP + TEA, G3 = sham operation. AP was induced by infusion of sodium taurocholate (0.5 mL/kg under 20 min) into the pancreatic duct. An epidural catheter was inserted under radiographic control with the tip at T8 level and

continuous infusion of bupivacaine was started to block segments T5 to T12, simultaneously with AP induction. Six hours observation time ensued. Arterial blood was analyzed for lipase and insulin levels. Local metabolic changes in the pancreatic parenchyma were monitored by microdialysis (MD). Blood glucose levels were maintained stable using glucose infusion in all groups. Total glucose consumption was determined.

Results: All comparisons were made between baseline and end of observation time values, given as mean ± 95% confidence interval. Increase in lipase levels was higher in G1 than G2 (0.66 ± 0.25 vs. 0.33 ± 0.15 μKat/L, P = 0.017). Decrease in insulin levels was more pronounced in G2 than G1 (–25.6 ± 13.2 vs. –9 ± 8.5 ng/L, P = 0.025). MD-glucose levels in pancreatic parenchyma decreased in G1 by 2.47 ± 1.02 and in G2 by 1.36 ± 1.16 mmol/L; there was no significant difference between G1 and G2 values (P = 0.104). There were no significant changes in lipase, insulin or MD-glucose levels in G3 during the observation time. Total glucose consumption was 37.6 ± 8.0 g in G1, 13.5 ± 3.5 in G2, and 5.5 ± 2.2 in G3; G1 vs. G2 (P = 0.001), G2 vs. G3 (P = 0.001).

Conclusion: TEA attenuated increase in lipase levels caused by AP, thus suggesting alleviation of the course of the disease. Decrease in insulin levels was more pronounced in G2 than G1 despite that TEA could have stimulated insulin secretion through the SNS blockade. Contrary to a previous study in rats, our study showed decrease in MD-glucose levels in the pancreatic parenchyma in AP. These findings raise a question whether TEA might be useful already at an early stage of the treatment of AP in man.

FOS286
PARENCHYMA-SPARING PANCREATECTOMY (PSP) FOR NON-INVASIVE INTRADUCTAL PAPILLARY AND MUCINOUS NEOPLAMS (IPMN)

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Introduction: For non-invasive IPMN limited to a branch-duct (BD) or to the central pancreas, standard resections such as pancreaticoduodenectomy (PD) or distal pancreatectomy (DP) can be considered as excessive due to their mortality, morbidity and functional consequences. PSP such as enucleation (EN) or central pancreatectomy (CP) are alternative procedures. The aim of this study was to assess EN and CP for presumed non-invasive IPMN.

Methods: From 1997 to 2010, 379 patients had resection for presumed IPMN, with 83 (22%) PSP attempted including EN (n = 52) or CP (n = 31). Symptoms were present in 58 pts (70%). After preoperative work-up (CT, MRI and EUS), surgery was indicated for suspected main duct (MD) involvement (n = 22), BD > 30 mm (n = 16) or with mural nodule (n = 11), otherwise for incapacitating symptoms. BD eligible for EN were localized on the uncus (n = 31), head (n = 9), neck/distal pancreas (n = 12). Intraoperative frozen section (FS) was routinely done and resection was converted to PD or DP if FS revealed MD involvement during CP, or at least moderate dysplasia on communicating duct during EN. Follow-up included clinical and biological assessment, with MRI on a yearly basis.

Results: Of 52 EN attempts, 7 (13%) were converted to PD due to inflammation or FS findings, and 2 were converted to CP. Of 31 CP attempts, 4 (13%) were converted to PD/DP. Overall, 72 (87%) pts had EN/CP with a 1.2% (n = 1) mortality rate and a 63% (n = 48) morbidity rate including 52% of pancreatic fistula (19% being grade B + C). Accuracy of FS was 95%. Definitive pathologic examination after EN/CP revealed non-IPMN diagnosis (n = 3; 4%), non-invasive IPMN (n = 67; 93%), and minimally invasive IPMN (n = 2; 3%). With a median follow-up of 41 mo. (12–156), 3 (4%) pts developed recurrent pancreatic symptoms, 2 (3%) developed de novo diabetes, and 2 (3%) de novo exocrine insufficiency; 3 pts (4%) were reoperated for persistant (n = 1) or recurrent (n = 2) IPMN.

Conclusion: Parenchyma-sparing pancreatectomy for presumed non invasive IPMN have a high feasibility rate and avoid standard resection consequences, particularly for benign lesions mimicking IPMN. For IPMN, preoperative selection is accurate with very few missed invasive IPMN. Early morbidity is high but counterbalanced by a low rate of symptom recurrence, very rare pancreatic insufficiency and a tumor recurrence rate equivalent to the one commonly observed after standard resections.

FOS287
TEMPORARY MESENTERICO-CAVAL SHUNT IS A SAFE AND EFFECTIVE TECHNIQUE OF VENOUS RESECTION DURING A WHIPPLE PROCEDURE

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Introduction: It is important to perform safe margin negative pancreatic head resection to improve outcomes in pancreatic malignancies. This study describes the technique and safety of extended Whipple procedure (WP) with venous resection using temporary redirection of the mesenteric venous drainage into the systemic circulation using a temporary mesenterico-caval shunt (TMCS).

Methods: One hundred and thirty two patients underwent surgery for periampular malignancies in 2005–2009: 67 men (50.8%) and 65 women (49.2%) at a mean age of 58.4 years. Eighty eight (66.7%) patients had exocrine adenocarcinoma of the pancreas and 44 (33.3%) patients had carcinoma of the ampula of Vater. Removal of the tumor with negative margins in some patients required resection of the porto-mesenteric confluence with diversion of the mesenteric venous flow after TMCS was created at an early stage of the resection. The mesenteric flow into the portal system was restored during the reconstruction stage of the procedure.

Results: Eighty four patients (64.4%) underwent WP with venous resection and TMCS, 44 patients (33.3%) had extended WP and 3 patients (2.3%) had standard WP. Mean length of WP with TMCS was 331.5 ± 6.2 min and the extended WP 293.5 ± 13 min (p = 0.01). Mean blood loss during extended WP with TMCS and extended WP were 403.5 ± 40 ml and 721.4 ± 111.4 ml respectively (p = 0.01).

The mortality rates for these two groups of patients were 2.3% and 2.2% (p = 0.5), major complication rates were 28.2% and 25% (p = 0.9), and length of stay was 19.3 ± 1.3 and 19.6 ± 2.4 days (p = 0.9). Margin negative resections were achieved in 118 (89.4%) patients. In 67 (50.7%) patients of the series there was histologically proven tumor invasion of the resected venous segment.

Conclusion: The diversion of the mesenteric venous flow into the systemic circulation prolonged the surgery but decreased the blood loss. A Whipple procedure with TMCS is a safe and feasible technique to perform margin negative resections in periampullary malignancies with venous tumor invasion.

FOS288
BEYOND THE LEARNING CURVE: ANALYSIS OF CONVERSION PREDICTORS IN ROBOTIC HEPATOBILIARY AND PANCREATIC SURGERY

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Introduction: Advanced robotic surgery has gained an increasing presence in the realm of minimally invasive hepatobiliary and pancreatic (HPB) surgery. However, currently in the literature, only anecdotal evidence has been available for guiding patient selection for complex robotic procedures. In the following analysis, we review our experience to date and look for predictors of conversion in robotic assisted HPB surgery.

Methods: A retrospective review was performed of all patients who underwent robotic assisted hepatobiliary and pancreatic procedures at a single institution from October 2008 through October 2011. Patient demographics, operative data, procedure type and conversion information were recorded. Trends were analyzed for indications for conversion during the study time period. An additional subset analysis was performed for laparoscopic distal pancreatectomy, with and without splenectomy. Statistical tests utilized included t-tests or Wilcoxon rank sum tests as appropriate for data measured on the interval or ordinal scales; chi-square and Fisher's exact tests were used for nominal data.

Results: 47 patients underwent robotic procedures by a single surgeon (JM) on a DaVinci Si robot. There were 22 males (46.8%) and 25 females (53.2%) with median age 65. There were 13 conversions, decreasing in frequency from 2009 (6) through 2011 (2). Conversions were associated with higher intraoperative blood loss (848.1 vs 156.3 ml, p < 0.01), more frequent transfusion (30.8% vs 2.9%, p = 0.02) and longer operative time (291.3 vs 184.9 min, p < 0.01). BMI (29.6 vs 28.5 kg/m^2, p = 0.43) and length of stay were not significantly different (7.92 vs 7.24 days, p = 0.15). 23 patients underwent distal pancreatectomy, 7 with splenectomy. There were 8 conversions in this group which were younger (56.6 vs 61.1 years) with higher BMI (29.3 kg/m^2 vs 27.8, p = 0.50).

Conclusion: Robotic assistance can provide beneficial advantages for complex, minimally invasive hepatobiliary and pancreatic surgical procedures. Factors prohibitive for successful completion of robotic assisted HPB surgeries include prolonged operating time and significant intraoperative blood loss. Careful patient selection and recognition of these conversion predictors will permit the maximal benefit of robotic assisted HPB surgery to be realized.

FOS289
LOW CALORIC ORAL STIMULATION OF GUT IN NECROTIZING PANCREATITIS

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Introduction: Early enteral nutrition facilitates recovery of the bowel function which is important precondition for successful conservative management of necrotizing pancreatitis (NP). Tube feeding is recognized as safe mode of nutritional support. The aim of study was to demonstrate experience with alternative low caloric oral stimulation of gut (OSG) in necrotizing pancreatitis.

Methods: Low caloric OSG circa 280–427 kcal daily was provided in patients with NP admitted within 72-hour period from the onset of disease. OSG was achieved in formula group using standard feeding formula and in food group using low fat natural yoghurt/oatmeal soup. Primary endpoints of retrospective study were mortality and complication rate. Secondary endpoints were infection rate, incidence of surgical interventions, length of intensive care unit (ICU) and hospital stay. Main variables included mean caloric intake; dynamics of C-reactive protein (CRP) and lipase; incidence of organ dysfunction according to sequential organ failure assessment (SOFA) score. Statistical analysis was done on SPSS 17 statistical software.

Results: OSG have received 309 patients with NP, 103 patients were admitted within 72-hour period. OSG was commenced 3–4 days after admission in 67 patients from formula group and in 36 patients from food group for 10 days. Systemic inflammation was observed in 92%–99% and MODS in 86%–93% of patients. Decrease of systemic inflammation was observed in 7-day period. Peak CRP decreased from 299 mg/l on day 3 to 202.0 mg/l on day 7, activity of lipase from 2528 IU/L on day 1 to 63 IU/L on day 7. Significant prevalence of CNS dysfunction was observed in food group, p < 0.03. Infection rate reached 39% in both groups and 32% of patients were operated. Mean ICU stay was 16 days and mean hospital stay was 39 days. Overall mortality reached 14.6%.

Conclusion: Low caloric oral stimulation of gut as constituent of complex treatment protocol facilitates recovery of the bowel function in patients with necrotizing pancreatitis without application of generally recommended nutritional support. Overall treatment results are comparable with internationally reported data.

FOS290

RESECTION OF AN ISOLATED ARTERIAL SEGMENT DURING PANCREATECTOMY

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Introduction: Isolated involvement of an arterial segment in pancreatic tumors occurs infrequently, and does not necessarily mean tumor unresctability being possibly caused by tumor location rather than by excessive growth. By the UICC staging system all tumors involving a main peripancreatic artery are deemed unresectable by definition and staged T4. We report on the outcome of a highly selected group of patients undergoing pancreatectomy plus resection of an isolated arterial segment at a single Institution.

Methods: From 01/1993 to 05/2011, resection of an isolated arterial segment was performed during 26 pancreatectomies. There were 12 males (46.1%) and 14 females (53.9%), with a mean age of 63.6 yrs. One patient (celiac trunk resection) was operated by robotic surgery. 2 patients underwent total pancreatectomy (7.7%), 5 pancreaticoduodenectomy (19.2%) and 19 distal splenopancreatectomy (73%). Resected arterial segments were celiac trunk (n = 14), hepatic artery (8), celiac trunk and hepatic artery (4). In 6 patients the hepatic arterial flow was reestablished by end-to-end anastomosis (n = 1), transposition of the left gastric artery (n = 1), and interposition of a saphenous vein jump graft (n = 4). Multivisceral resection was required in 9 patients.

Results: Final pathology disclosed ductal adenocarcinoma (DA) in 18 patients (69.2%), other pancreatic tumor types or periampullary carcinoma in 4 patients, mucinous cystic tumor in 1 patient, and metastatic tumor in 3 patients. 21 DA patients were node positive (85%). Post-operative morbidity and mortality were 55.5% and 3.8%, respectively. After a mean follow up period of 111 months (range 5–225), actual survival rate was 64% at 1 year and 20% at 3 years. Equivalent figures for DA were 30% and 15%, respectively. These data favorably compare with an historical cohort of patients with locally advanced DA undergoing palliation without resection. Noteworthy, no patient developed local recurrence, despite none received pre- or post-operative radiation.

Conclusion: In patients affected by DA, the resection remains key for cure and possibly provides the best palliative treatment. Our experience shows that highly selected patients with isolated involvement of celiac trunk and/or hepatic artery may undergo pancreatectomy with results similar to patients without vascular involvement and superior to those offered by palliation or medical therapy alone. The lack of local recurrence seems to be a relevant treatment endpoint, when cure cannot be achieved.

FOS291

STUDY OF THE PET WITH 18 FLUORODEOXYGLUCOSE AS PARAMETER PROGNOSIS IN PATIENTS WITH NEUROENDOCRINE TUMOR OF PANCREAS

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Introduction: The rule of positron emission tomography (PET) in the diagnosis of pancreas cancer has been well established. But, it is still controversial its application on neuroendocrine tumor of pancreas (NETP).

Ki-67 proliferation index is a well known prognostic factor of pancreas NETP. Its lower value is related to poor prognosis and it is used for the prognostic classification: Ki-67 < 2%: neuroendocrine tumor; Ki-67 range from 2% to 20%: well differentiated neuroendocrine cancer; poor differentiated neuroendocrine cancer.

Methods: The objective of this report is to assess the role of the PET as prognostic factor of NET.

We reviewed retrospectively 78 patients that underwent pancreas surgery form March 2009 to March 2011. NETP were 21 (26.9%): 11 male and 10 women. Median age was 58 years (range: 35–73). NETP classification was: 8 neuroendocrine tumor (38%); 9 well differentiated tumors (42%); 4 poor differentiated tumors (19%).

Mean tumoral size: neuroendocrine tumor: 1.56 cm; neuroendocrine carcinoma: 5.05 ($p < 0.05$). The prognostic validation of PET is based upon a bivariant study: positive/negative PET with Ki-67 index and tumoral size.

Results: All patients underwent PET tomography. Twelve positive (mean SUV of 6.34) and nine negative. The octreotide scan of these 9 negative PET patients was positive in all.

Patients with positive PET tomography has a Ki-67 mean index of 22% and a mean tumoral size of 4.5 cm; patients with negative PET tomography and Octreotide positive scan has a Ki-67 mean index of 11.6% and a mean tumoral size of 3.5 cm ($p < 0.05$).

Conclusion: According to our results it seems that a positive PET tomography is related with a worse prognosis (higher size and Ki-67) than a positive octreotide scan. Further study is needed to prove the influence on survival rates.

FOS292

POST PANCREATECTOMY HAEMORRHAGE – A TEN YEAR EXPERIENCE

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Introduction: Post-pancreatectomy haemorrhage (PPH) is uncommon (1–8% pancreatic resections) but accounts for significant mortality (11–38%). PPH can be defined as per the International Study Group of Pancreatic Surgery, ISGPS, criteria. Onset can be early (<24 hours) or late (>24 hours), bleeding can be intra- or extra-luminal and can be graded

(A-C) depending on severity, onset and clinical consequences. Using these criteria to quantify PPH allows identification of risk factors and prognostic indicators.

Methods: All patients undergoing pancreatectomy (Whipples/PPPD/subtotal or total pancreatectomy) between 1st January 2000 and 31st December 2010 were included. Our database included patient demographics, mode of presentation, type of surgery, characteristics of post-pancreatectomy haemorrhage, management of haemorrhage and outcome of any intervention. Data regarding other post-operative complications, histopathology, tumour staging, follow up and survival were also obtained. Correlation between patient outcome and potential risk factors was assessed using Chi squared, SPSS.

Results: 392 pts were included, 13 (3%) had PPH. Median age 67 yrs (IQR 61–77), M : F 9:4. 3 pts had early and 10 late PPH. 3 had intraluminal bleeding, 8 extraluminal and 2 pts both. 5 had pancreatic leak and sepsis and all these had late PPH. Bleeding source was unidentified for 3, the gastrojejunal (GJ) anastamosis in 3, and arterial in 7 (gastroduodenal/R,L hepatic/inf epigastric/Arc of Buhler). 8 had grade B PPH and 5 grade C. GJ bleeding was controlled surgically (2 pts) and endoscopically (1 pt). Vessel bleeding was controlled by embolisation/gluing. 3 pts had multiple angiographic procedures and all these died. No significant association existed between risk factors and survival (Chi squared). 8 pts died, median post-op survival 116 days (31–260).

Conclusion: Although uncommon, mortality following post-pancreatectomy haemorrhage remains high. Early haemorrhage can be controlled by surgical, endoscopic and angiographic manoeuvres. Late haemorrhage is associated with anastamotic leaks and sepsis. Repeated angiographic attempts at haemorrhage control is associated with 100% mortality, and probably reflects the end stage of this systemic inflammatory response process.

FOS293
SURROGATE ONCOLOGIC MARKERS FOR LONG TERM SURVIVAL ARE IMPROVED WITH THE USE OF MINIMAL ACCESS SURGERY FOR PANCREATIC CANCER

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Introduction: Improved survival rates for pancreatic cancer are difficult to demonstrate with any alterations of surgical technique including laparoscopy. However, several variables have been shown to improve cancer outcomes for pancreas malignancies in patients undergoing open surgery. This study aims to specifically look at these parameters as surrogate markers for improved oncologic outcomes for those patients undergoing laparoscopic pancreatectomy versus open pancreatectomy.

Methods: A review of 5 year time period (July 2006–July 2011) at our institution of open vs. totally laparoscopic pancreas resections was performed. Outcome comparisons were performed for those undergoing pancreaticoduodenectomy/total pancreatectomy (PD/TP) and distal pancreatectomy (DP). Standard statistical analysis (t-test & two-tailed Fisher's exact test) was performed. PD/TP was performed in 139 and 40 patients undergoing open and laparoscopic surgery respectively, while DP was performed in 42 and 68 patients undergoing open and laparoscopic surgery respectively. Preoperative characteristics including demographics, comorbities, ASA status, and primary pathology were not statistically different for all groups.

Results: Pancreatic fistula, complications, need for reoperation, and 90 day mortality were not significantly different for either the PD/TP or DP patient groups. Estimated blood loss, red blood cell transfusions, overall intensive care and hospital length of stay were significantly lower in the laparoscopic patients compared to the open patients for both the PD/TP and DP groups. Tumor size, R0 resection rate, and node positivity were no different for either the PD/TP or DP groups. Overall number of lymph nodes was significantly higher in the laparoscopic patients compared to the open patients for both the PD/TP and DP groups. Positive lymph node ratio was significantly lower in the laparoscopic patients for PD/TP groups but not for the DP groups.

Conclusion: The use of minimal access surgery for pancreatic disease is increasing. Long term follow up for patients undergoing laparoscopic pancreas surgery with survival and oncologic outcome data are currently unavailable. This limited retrospective study appears to suggest that surrogate oncologic markers are improved with the use of laparoscopy and may suggest benefit for a minimal access approach.

FOS294
DECREASING TRENDS IN SURGERY FOR PANCREATIC CANCER: A 21-YEAR POPULATION-BASED ANALYSIS

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Introduction: Resection is the only curative option for patients with pancreatic cancer. This population-based study examines trends in surgery offered and performed for patients with localized (Stage I) and regional (Stage II & III) pancreas cancer and the impact on survival over two decades.

Methods: The Surveillance, Epidemiology, and End Results (SEER) Database was queried to identify patients with localized and regional pancreatic cancer (Stages I-III) that were diagnosed between 1988 and 2008. Interval trends in surgery offered and performed were evaluated over time (Year Stratums (YS): 1988–1993, 1994–1998, 1999–2003 and 2004–2008) and correlated with survival.

Results: Patients with local (3,411) and regional (14,505) disease had an increasing trend in surgery offered from 1988–2003, and then from 2004 to 2008, there was an 11% decrease in surgery offered ($p < 0.0001$). This decrease in surgery offered correlated with a 4% decrease in surgery performed ($p < 0.0001$). However, 3-yr survival for surgically treated patients increased over time for local (31% to 55%, $p < 0.0001$) and regional disease (11% to 24%, $p < 0.0001$). More importantly, 3-yr survival was more than 10-fold higher compared to unresected patients with local disease and 5–8-fold higher with regional disease ($p < 0.0001$).

Conclusion: In the largest temporal analysis of local and regional pancreatic cancer, we demonstrate a recent decrease

in surgical resections offered and performed. Furthermore, not only has survival continued to increase over time after surgical resection, it has remained significantly higher compared to unresected patients. Further studies are needed to determine why despite the seeming benefit in pancreatic resection, surgical treatments are declining for pancreatic cancer.

FOS295
IMPACT OF HUMAN ADIPOSE TISSUE DERIVED REGENERATIVE CELL FOR CRYOPRESERVED PORCINE ISLETS

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Introduction: There were some urgent issues for islet transplantation even though it represents promising future for the treatment of type 1 diabetes. For xenotransplantation, we have already reported that hADRCs (human-Adipose Tissue Derived Regenerative Cells) demonstrated the regenerative effects for injured pancreatic islets in vivo (IHPBA 2010), here we show our investigation whether hADRCs have protective effects to injured cryopreserved porcine pancreatic islets.

Methods: Step-wise cryopreserved 1.0 × 105 porcine islets (72 hours) were thewed and co-cultured with hADRCs without cell-to-cell contact (Co-culture group), 1.0 × 105 islets were cultured alone (Control group) and hADRCs were cultured alone (ADRCs group). Recovery rate (%), viability of islets (%) and morphology score were evaluated after 48 hours culture. Concentration of insulin and cytokines such as IL-1B, IL-6, IL-8, IL-10, TNF-α and VEGF in culture medium supernatants in all groups were measured.

Results: Islets in Co-culture group showed significantly better recovery rate (67.3% vs 19.8%, $P < 0.05$) and contained significantly better viability (84.4% vs 63.5%, $P < 0.05$). Morphology score of islets in Co-culture group tend to be higher in histological assessment. Insulin, IL-6, IL-8, VEGF in culture medium were higher significantly (insulin; 33690 μIU/ml vs 3147.8 μIU/ml vs 0 μIU/ml, IL-6; 3400 pg/ml vs 0.2 pg/ml vs 0 pg/ml, IL-8; 25.2 pg/ml vs 2.0 pg/ml vs 0 pg/ml, VEGF; 892 pg/ml vs 20 pg/ml vs 10 pg/ml, Co-culture group vs Control group vs ADRCs group; $P < 0.01$, respectively).

Conclusion: Cryopreserved porcine islets showed significantly better recovery with co-culture of hADRCs. These supportive effects were strongly suggested due to the cytokine network. These secretions required injured cells, however, did not require the direct cell-to-cell contact. This co-culture may be a new strategy for porcine islet xenotransplantation from cryopreserved islet cell bank.

FOS296
CLINICAL EFFECTS OF NEOADJUVANT CHEMORADIATION THERAPY USING S-1 FOLLOWED BY SURGICAL RESECTION FOR PATIENTS WITH BORDERLINE RESECTABLE PANCREATIC CANCER

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Introduction: We have reported that surgical resection following neo-adjuvant chemoradiation therapy (NACRT) can be associated with improved prognosis of pancreatic cancer patients (Pancreas 2009 and 2011 in press). The aim of this study is to explore short-term results of the new regimen of NACRT using S-1 followed by surgical resection in patients with borderline resectable pancreatic cancer.

Methods: Between 2006 and 2010, 17 patients who underwent surgical resection and adjuvant chemotherapy, were classified as adjuvant group, and 23 patients who underwent NACRT followed by surgical resection and adjuvant chemotherapy, were classified as NACRT group. The regimen of NACRT was consisted of S-1 (orally twice daily, 5 days in a week, 80 mg/m^2/day) and concurrent radiotherapy (a total of 50.4 Gy). The primary endpoint was the frequency of pathological curative resection (R0).

Results: There was no significant difference in clinical backgrounds between two groups. Other organ resection including vascular resection was done for 14 of 17 patients in adjuvant group and for 16 of 23 patients in NACRT group. The R0 rate in NACRT group was significantly better than in adjuvant group (21/23 vs 7/17, $p = 0.003$). Although there was no significant difference in retrieved number of lymph node, the number of metastatic lymph nodes in NACRT group (1 (0–25)) was significantly lower than in adjuvant group (2 (0–19), $p = 0.022$). The frequency of local relapse in NACRT group was significantly lower than in adjuvant group at 1 year after surgical resection (0% vs 35%, $p = 0.022$).

Conclusion: NACRT using S-1 can improve the R0 rate, and number of metastatic lymph nodes in patients with borderline resectable pancreatic cancer, resulting in better local control.

FOS297
LONG TERM FOLLOW-UP AFTER PANCREATICO-JEJUNOSTOMY FOR CHRONIC PANCREATITIS IN 180 PATIENTS

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Introduction: Treatment of chronic pancreatitis is a challenging condition for surgeons: surgical techniques are based on decompression and/or resection techniques. The objective of this large retrospective series was to evaluate the immediate and long-term outcome of pancreaticojejunostomy (PJ) in the treatment of chronic pancreatitis.

Methods: From 1980 to 2002 all consecutive patients with chronic pancreatitis with dilated main pancreatic duct and

treated by PJ were included. Postoperative morbidity and mortality rates were reviewed. The resumption of work and physical activity, alcohol consumption, weight and the presence abdominal pain were assessed every 6 months. In all non diabetic patients an oral glucose tolerance test was performed. Functional results were classed into three groups: good, mild or bad.

Results: There were 155 men and 25 women. Chronic pain was the indication for PJ in 126 patients (90%). Postoperative mortality rate was 1.1% and postoperative morbidity rate was 10%. The mean follow-up was 11.5 years (range: 7–27 years). Functional results were good or mild in 91.5% of cases. A mean weight increase of 5.9 kg was observed in 103 patients (79%). Fifteen patients developed de novo diabetes mellitus. In the 50 patients with preoperative diabetes, 26 suffered deterioration of their status.

Conclusion: In case of dilated main pancreatic duct, PJ must be indicated because of its good efficiency on pain relief with low mortality and morbidity rates.

FOS298
DOUBLE OMENTAL FLAP REDUCED PERI-ANASTOMOTIC COLLECTIONS AND RE-LAPAROTOMY RATES AFTER PANCREATICODUODENECTOMY WITH PANCREATICOGASTROSTOMY

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Introduction: Omental flap has been proposed after pancreaticoduodenectomy (PD) to reduce perioperative morbidity. In view to verify such hypothesis we compared the results of double omental flap (DOF) after PD with pancreaticogastrostomy (PG) to a standard technique.

Methods: From January 2009 to December 2009, 61 patients underwent PD with PG for pancreatic adenocarcinoma in our department. Perioperative data were prospectively recorded, and postoperative outcome of patients who underwent or not a DOF (group DOF+ = 33 and group DOF– = 28, respectively) was analyzed.

Results: The overall postoperative mortality was 1.6% (n = 1). The overall postoperative morbidity rate was 27.8% (n = 17). PF occurred in 8 (13.1%) patients and was of grade A in 6 (9.8%) patients. Clinically relevant PF (grade B and C) occurred in 2 (3.2%) patients. The univariate analysis showed that in the DOF+ groups there was a significant reduction of peri-anastomotic collections (P = 0.034) and a significant reduction of the re-laparotomy rate (P = 0.05).

Conclusion: The DOF contributed to reduce the rate of peri-anastomotic collections as well as the rate of re-laparotomy. A DOF should be considered a further step toward a reduction of surgical related complications after PD with PG.

FOS299
RANDOMIZED PROSPECTIVE STUDY ON THE OPTIMAL EXTENT OF RESECTION IN PANCREATIC HEAD CANCER

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Introduction: Although many surgeons have tried to improve survival outcome of pancreatic ductal adenocarcinoma (PDAC) introducing aggressive resection of lymph node and nerve plexus along vessels, there was not enough evidence that extensive surgery could prolong survival. This study is designed to establish a surgical guideline for extent of surgery in the management of pancreatic head cancer.

Methods: Total of 253 patients was enrolled from 13 major hospitals in Korea. Web based randomization was completed in 200 patients; Participants were allocated to standard (SL) or extended lymphadenectomy group (EL). 167 patients from 7 centers who fulfilled the inclusion criteria were finally included for further analysis. Surgical procedure was standardized through repeated consensus meetings and confirmed by operation photographs. All of the study subjects were followed up for at least 2 years after operation.

Results: There was no difference between two groups in terms of patient demographics or preoperative disease status. Operation time was longer and estimated blood loss was higher in EL than SL. R0 resection rate was comparable between 2 groups (85.5% (SL) vs. 90.7% (EL)). The retrieved lymph node number was higher in EL (33.7 (EL) vs. 17.3 (SL)), but AJCC stage was comparable in each group (p = 0.443). Morbidity rate was slightly higher in EL than SL (43.0% vs. 32.5%). There were 2 operative mortality in EL while no mortality in SL (p = 0.497). SL versus EL revealed comparable survival outcome after R0 resection (19 m vs. 18 m, p = 0.239). There was no survival difference according to extent of lymphadenectomy regardless of lymph node metastasis.

Conclusion: This multicenter prospective randomized clinical trial suggests that extended lymphadenectomy with nerve plexus excision has no significant survival benefit in patients with pancreatic head cancer when compared with standard lymphadenectomy. Keeping a balance between oncologic radicality and quality of life after pancreatectomy, standard resection is enough operation method for the management of pancreatic head cancer.

FOS300
CHANGING TRENDS OF SURGICAL MANAGEMENT FOR PANCREATIC DISEASE AT A SINGLE HIGH VOLUME INSTITUTION

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Introduction: Laparoscopic pancreatic surgery (LPS) has been slow in gaining acceptance. Pancreatic resection is associated with 40% morbidity, the largest component being wound complications (18%) which can significantly delay recovery. We examine the changing trend towards minimally invasive pancreas surgery at a high volume institution which has implications in the training of future pancreatic surgeons.

Methods: This is a single institution retrospective review from a prospectively collected database from June of 2006 to December of 2011. Main outcome measures include operative time, length of hospital stay, lymph nodes resected, and tumor size.

Results: 113 laparoscopic pancreatic resections were performed: 89 distal pancreatectomies (LDP), 20 whipples (LW), 3 enucleations, and 1 central pancreatectomy. LDP mean operative time was 258 minutes. Average length of stay (LOS) was 5.9 days, and 37% of the LDPs were spleen preserving. Mean tumor size was 2.3 cm and an average of 11.4 lymph nodes were harvested. LW mean operative time was 454 minutes, average LOS was 11.7 days, and mean tumor size was 2.7 cm with an average of 19 lymph nodes harvested.

The number of laparoscopic pancreatic resections increased significantly over this five-year period (3 cases in 2006 to 43 in 2011). The average wound infection rate of 18% seen with open resections drops down to 2% in LPS ($p < 0.05$).

Conclusion: Totally laparoscopic resections can be done safely while maintaining oncologic principals. Minimally invasive technique allows for an improvement in morbidity, primarily with wound infections. This has led to a shift at our institution with the progressive increase of laparoscopic resections from 2006–2011. Surgical training will need to evolve by making a concerted effort to emphasize advanced laparoscopic skills in the education of future pancreatic surgeons.

FOS301
INVESTIGATING NOTCH 2 IN PANCREATIC CANCER

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Introduction: Pancreatic cancer is an aggressive malignancy with low survival rates. Novel therapies are urgently required to improve patient survival. Abnormal Notch signalling has been implicated in several malignancies including pancreatic ductal adenocarcinoma (PDAC). Down regulation of Notch signalling could be considered as a novel approach for pancreatic cancer therapy. Our aim is to investigate Notch 2 expression in pancreatic cancer and to check its response to curcumin and Gamma Secretase Inhibitors.

Methods: A primary antibody for the active form of Notch 2 was obtained and validated. Pancreatic cancer tissue slides were checked for the presence of Notch 2 using immunohistochemistry. Pancreatic cancer cells were treated with increasing concentrations of Gamma Secretase Inhibitors (GSI) and curcumin, separately, for a period of 24 hours, using DMSO as control. The effect on Notch 2 signalling pathway was examined using western blot analysis.

Results: Notch 2 was present in the pancreatic cancer cells and was significantly overexpressed in pancreatic cancer tissue. There was no decrease in Notch 2 levels when treated with increasing concentrations of GSIs and curcumin.

Conclusion: Notch 2 is overexpressed in pancreatic cancer tissue. Our results suggest curcumin does not utilize Notch 2 signalling pathway when inhibiting nuclear factor-B (NF-B) pathway in causing cell growth inhibition and apoptosis in pancreatic cancer cells. Gamma secretase induced cleavage is one of the key steps in Notch activation and inhibition of GS activity has inhibited tumour progression in murine models of PDAC. The lack of activity of the GSI against Notch 2 requires further investigation.

FOS302
MATHEMATICAL MODELING REVEALS THE NUMBER OF BIOMARKERS REQUIRED FOR ACCURATE PANCREATIC ADENOCARCINOMA DETECTION

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Introduction: Most patients with pancreatic adenocarcinoma (PA) present after the disease has advanced to an incurable stage. Screening for PA would likely improve outcomes through earlier detection, but could result in unacceptable levels of false-positive diagnoses using current biomarkers. We used characteristics of nine PA biomarkers measured in human sera to model the behavior of biomarker panels in order to delineate the number of biomarkers required for accurate detection of PA.

Methods: Levels of AXL, CA 19-9, haptoglobin, hyaluronic acid, MMP-7, MMP-11, osteopontin, serum amyloid A, and TIMP-1 were measured in sera from 117 healthy control subjects and 58 chronic pancreatitis patients, and 159 PA patients prior to treatment.. Threshold indicators were constructed for individual biomarkers at the 95th percentile of the control value. We modeled the behavior of a biomarker panel consisting of a sum of indicator variables, then chose a cutoff for the sum to force specificity to be high, and calculated the sensitivity. To generate correlated biomarkers, we simulated correlated continuous biomarker data, made a 95th percentile cutoff for each biomarker, and then assessed performance as above.

Results: Between 17% and 75% of the PA cases had values above the 95th percentile of control values with an average sensitivity for all biomarkers of 32%. The correlation between the indicator variables was near zero in controls and slightly positive in PA cases. None of the biomarkers were

highly correlated. The model shows that a panel consisting of 40 biomarkers characterized individually by 32% sensitivity at 95% specificity would require any 7 biomarkers to be above the threshold and would result in an panel specificity and sensitivity of 99% each. The addition of correlation assumptions reduced sensitivity for the 40 biomarker panel to 94% at an average correlation of 0.05 and 84% at an average correlation of 0.15.

Conclusion: Our modeling shows that a highly accurate, blood-based PA diagnostic panel can be developed from a reasonable number of individual serum biomarkers that are relatively weak classifiers when used singly. The model provides a framework for maximizing biomarker sensitivities and minimizing biomarker correlation. A panel constructed as described is advantageous in that a high level of specificity can be forced and allows for heterogeneity among patients and their tumor characteristics.

FOS303
PANCREATIC ENUCLEATIONS: PANCREATIC FISTULA RISK DEPENDS ON TUMOR LOCALIZATION

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Introduction: In selected patients with small and benign pancreatic neoplasms, enucleation is an alternative to standard resections. Enucleation is associated with a decreased incidence of long-term pancreatic insufficiency but its specific morbidity is little known. The aim of this study was to evaluate postoperative morbidity with a special attention to pancreatic fistula risk following pancreatic enucleation.

Methods: From 1996 to 2010, 126 consecutive patients who underwent 129 pancreatic enucleations (3 multiple) were included. Patients who had resection of uncinate process or enucleation associated with standard resection were excluded. Enucleation was considered in benign or low-grade neoplasms without any contact with the main pancreatic duct after intraoperative assessment by ultrasonography. Hemostasis and pancreatostasis were performed using stitches only, and peripancreatic drainage systematically used. Pancreatic fistula was defined and graded according to the ISGPF definitions. Predictive risk factors of pancreatic fistula were studied by uni- and multivariate analysis.

Results: Enucleation was indicated for branch-duct IPMN (n = 37, 29%), non functioning endocrine tumor (n = 35, 28%), mucinous cystadenoma (n = 24, 19%) insulinoma (n = 11, 9%), and miscellaneous (n = 19, 15%). Mean tumor size was 21 mm (range: 6–60, median = 15). Tumor were localized in distal pancreas (n = 46, 37%), uncinate process (n = 33, 26%), head (n = 25, 20%) and neck (n = 22, 17%). Mortality was 0.8% (n = 1). Morbidity was 59% (n = 74), mainly represented by pancreatic fistula (n = 72, 57%) including 52 (70%) graded B or C. In multivariate analysis, only uncinate localization was associated with an increased risk of pancreatic fistula (p = 0.02; HR 1.7). With a 22 months median follow-up, de novo diabetes and tumor recurrence occurred in 0.8% and 6.3%, respectively.

Conclusion: After pancreatic enucleation, pancreatic fistula occurred in about two-thirds of patients, especially when tumor is located in the uncinate process. This increased morbidity is justified by excellent long-term outcome. It represents an excellent alternative to standard pancreatic resections, especially Whipple procedure, in highly selected patients with small benign lesions.

FOS304
INTRAPANCREATIC ACTIVATED GLIA IS A HALLMARK OF PANCREATIC NEUROPATHY IN PANCREATIC CANCER

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Introduction: Pancreatic neuropathy in pancreatic adenocarcinoma (PCa) is characterized by intrapancreatic neural hypertrophy, neural sprouting, pancreatic neuritis and neural invasion, resulting in abdominal neuropathic pain sensation. However, the role of glia cells as the key actor in peripheral neuropathies and pain has not yet been investigated in PCa. Therefore, our aim in this study was to elucidate the activation state of peripheral glia, i.e. Schwann cells, in pancreatic neuropathy in PCa.

Methods: To imitate the conditions in PCa microenvironment, human Schwann cells (hSc) were cultivated under hypoxia and within PCa cell supernatants for varying time periods. To assess the activation state of hSc, the three cardinal features of reactive glia, i.e. enhanced proliferation, cellular hypertrophy and upregulation of the intermediate filaments GFAP, nestin and vimentin were investigated via MTT proliferation assay, cell area measurement and immunoblotting.

Results: hSc demonstrate a prominent upregulation of GFAP, nestin and vimentin under hypoxia. When exposed to components of PCa microenvironment, hSc showed increased proliferation, enhanced GFAP expression and a star-like cellular conformation ("stellation"). In contrast, these parameters of glial activation were completely absent when hSc were exposed to colon cancer cell supernatants.

Conclusion: Intrapancreatic glia is specifically activated during PCa and bears all known major characteristics of reactive glia, as known from astrocytes of the central nervous system. This seminal demonstration of activated glia in a visceral neuropathy has profound implications for proper understanding of the neuropathic pain syndrome in PCa.

FOS305
REDO-OPERATIONS IN CHRONIC PANCREATITIS – A SUCCESSFUL OPTION FOR SELECTED PATIENTS

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Introduction: Surgery in chronic pancreatitis (CP) includes draining and resecting procedures. Besides chronic pain as the main indication, cholestasis and suspicion of malignancy are important indications for operations in CP. In a small number of CP patients a second operation is required due to recurrent CP symptoms. Aim of the study was to determine

frequency, indications, surgical procedures and outcome of redo-operations in CP patients.

Methods: During an observation period of 8 years, data of all CP patients undergoing surgery were analyzed with regard to recurrent operations. Indications and surgical procedures for the first and second operation were analyzed as well as operative parameters, complications and outcome.

Results: During the observation period 665 operations were performed in CP patients: 233 Whipple operations, 207 duodenum-preserving pancreatic head resections (DPPHR), 48 distal pancreatectomies and others. A second operation was necessary in only 34 patients (5.1%) due to recurrent pain (41%), pancreatic or bile duct obstruction (38%), symptomatic pseudocysts (18%) and suspected malignancy (3%). Secondary operations were Whipple operations (n = 18), DPPHR (n = 5), hepatico-jejunostomies (n = 5), total pancreatectomies (n = 2) and drainage procedures (n = 4). Median time between primary and second operations was 3.1 y. No perioperative deaths occurred, morbidity was 27%. Life quality improved significantly and opioid pain medication was required in only 16.

Conclusion: Redo-operations in CP are rarely necessary (5%). Indications mainly include recurrent pain and cholestasis. Surgery can be performed with low morbidity and mortality and results are excellent in long-term outcome. The low need for surgical reinterventions supports the concept of organ and function preserving resections such as duodenum-preserving pancreatic head resections.

FOS306
LAPAROSCOPIC DISTAL PANCREATIC RESECTION: IS THERE A LEARNING CURVE?

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Introduction: laparoscopic distal pancreatic resections (LDPR) are more and more performed. The impact of the learning curve is not well known. Our aim was to study the results of LDPR during 2 consecutive periods.

Methods: From a prospective unicentric maintained database, 55 patients who underwent LDPR between January 2008 and December 2011 were included and divided in 2 periods, including period 1 (January 2008-decembre 2009; n = 20) and period 2 (January 2010-decembre 2011; n = 35). Age, sex, body mass index (BMI), indication, operative (duration, blood loss, conversion, hand-assisted, necessity of sacrifice of the spleen or its vessels) and postoperative data (mortality, pancreatic fistula [PF], re intervention, mean hospital stay) were studied. No difference between periods 1 vs 2 regarding age (51 vs 56; p = 0.12), sex (F/M = 14/6 vs 17/18. p = 0.12), BMI (24.8 vs 26.3 kg/m², p = 0.48).

Results: Comparison of Periods 1 vs 2 showed less resections for adenocarcinoma (5% vs 20%; p = 0.129), more blood loss (256 ml vs 215 ml; p = 0.63), longer duration (254 mn vs 172 mn, p < 0.001), more conversion (15% vs 8.6%; p = 0.46), less hand-assisted (0% vs 17.1%; p = 0.021%) and re interventions (10% vs 0%; p = 0.05). In the subgroup of patients scheduled for pancreatectomy without splenectomy (n = 33), we note higher rate of splenectomy (21.4% vs 0%. p = 0.025) but no significant difference regarding the sacrifice of splenic vessels (28.5% vs 47%; p = 0.53). No difference regarding mortality (0%), PF rate (70% vs 62.9%; p = 0.87) and the hospital stay (24 [8–70] vs 18 j [10–34], p = 0.11).

Conclusion: there is probably a learning curve allowing more rapid and safer resection with little impact on the post-operative course. The lower conversion and unnecessary splenectomies rate can be explained by the learning curve, the hand assisted procedure and the sacrifice of the splenic vessels.

FOS307
PANCREATIC RESECTIONS FOR CYSTIC NEOPLASMS: FROM THE SURGEON'S PRESUMPTION TO THE PATHOLOGIST'S REALITY

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Introduction: Current guidelines for the management of pancreatic cystic neoplasms are based on the assumption that these lesions can be classified correctly on the basis of features of cross-sectional imaging. But a certain degree of overlap between different lesions exists, and little is known about the rate of inaccurate preoperative diagnoses. To address this issue, preoperative and final pathologic diagnoses of patients resected for a presumed pancreatic cystic neoplasm were compared.

Methods: Retrospective analysis was undertaken of patients managed operatively between 2000 and 2010. Preoperative work-up was reviewed to identify diagnostic pitfalls and potential risk factors for incorrect preoperative characterization of cystic lesions presumed to be neoplastic.

Results: 476 patients were analyzed. Final pathologic diagnosis matched the preoperative diagnosis in 78% of cases. The highest accuracy was reached for solid pseudopapillary neoplasms (95%) and for main duct/mixed duct IPMNs (81%). Surprisingly, 23 cysts (5%) were found to be ductal adenocarcinoma, while 45 patients (9%) underwent a pancreatic resection for a non-neoplastic condition. The use of a routine radiologic work-up, including contrast-enhanced US and MRI, was associated with a favorably correct characterization of the cystic lesion. EUS did not seem to improve diagnostic accuracy. Increased levels of serum CA19-9 resulted as risk factors for an incorrect diagnosis as well as for a final diagnosis of ductal adenocarcinoma.

Conclusion: Overall rate of inaccurate preoperative diagnoses in a tertiary care center with a broad experience in pancreatology approached 22%. Serum Ca 19-9 is an important complementary tool within the context of preoperative investigation of cystic neoplasms of the pancreas.

FOS308

NEUTROPHIL-LYMPOCYTE RATIO (NLR) AS A PREDICTOR OF POOR PROGNOSIS IN ACUTE PANCREATITIS: VALIDATION OF AN OPTIMAL NLR

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Introduction: Current scoring systems in acute pancreatitis pancreatic (AP) are cumbersome and require multiple investigations and delay in scoring. Early deterioration in AP is associated with marked inflammatory response.
Methods: Neutrophil to lymphocyte ratio (NLR) was calculated on Day 1, 2 and 3 of admission and correlated with outcome. Poor outcome was defined as intensive care admission, need for nutritional support, complications directly associated with pancreatitis, pancreatic necrosis or death.
Results: 146 consecutive patients (January-December 2010) were included with 22 having poor outcome. NLR in the poor prognosis group was significantly higher than in the favourable prognosis group on all 3 days (Day 1: 17.4 vs. 13.3; Day 2: 16.2 vs. 10.2; Day 3: 14.6 vs. 7.2). The optimal cut-of calculated from a ROC curve was 10.6, 8.1 and 4.8 on Day 1, 2 and 3 respectively giving a sensitivity (Sn) and Specificity (Sp) of 63.6% and 56.7% (Day 1); 86.4% (Sn) and 50% (Sp) Day 2; 90.9% (Sn) and 53.5% (Sp) Day 3. The Positive and Negative values of poor outcome were 21.2% and 89.5% on Day 1, 31.1% and 93.3% on Day 2 and 29.9% and 96.4% on Day 3.
Conclusion: Admission and early NLR is significantly higher in patients with poor outcome and is an independent predictor of poor prognosis.

FOS309

PORTAL VEIN STENOSIS: POSTOPERATIVE COMPLICATION OF PANCREATICODUODENECTOMY AND ITS MANAGEMENTS

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Introduction: Portal vein stenosis (PVS) after pancreaticoduodenectomy (PD) is one of the notable complications which require adequate treatment. It may cause fatal gastrointestinal bleeding due to formation of gastrointestinal varices. We conducted retrospective study for portal vein stenosis after PD.
Methods: Among 98 patients undergoing PD in our institute from 2000 to 2010, 25 PVS were diagnosed by CT scan with typical collateral formation. Fifteen cases were due to local recurrence of tumor diagnosed with median postoperative time (MPT) of 14 months. Remaining no-malignant, benign PSV cases, diagnosed with MPT of 1 month (n = 10), were compared retrospectively with non-PSV cases (n = 73) on preoperative demographic, clinical data, surgical procedure, pathological diagnosis, and postoperative complications.
Results: There was no statistically significant difference in parameters collected between the groups, however, the incidence of postoperative pancreatic fistula (PVS: 5/10, 50% / non-PVS: 21/73 28.8%) and perioperative irradiation (PVS: 3/10, 30% / non-PVS: 14/73, 19.2%) tended to be higher in PVS than non-PVS. Periportal fluid collections were usually found in most of the cases (8 of 10) within a week. PVS were found only in cases performing ante-colic reconstruction of pancreatico-intestinal anastomosis (10 of 55), but not in cases performing retro-colic approach (0 of 18). Two of 3 PVS cases suffering from gastrointestinal bleeding from gastrointestinal varices were successfully treated with insertion of expandable metallic stent in portal vein.
Conclusion: Pancreatic fistula, perioperative irradiation or/and antecolic reconstruction of alimentary tract seemed to be risk factors for causing PVS and needs to be determined in the future prospective study.

FOS310

K-RAS MUTATION ANALYSIS IN ENDOSONOGRAPHY-GUIDED FINE NEEDLE ASPIRATION OF PANCREATIC SOLID LESIONS

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Introduction: KRAS gene mutations (point mutations of codon 12) have been found in 75–90% of infiltrating PADC and such a frequency seems sufficiently high to deserve diagnostic application. Aim of the present study was to investigate the feasibility and reproducibility of combined cytopathological examination and KRAS mutation analysis in improving the diagnostic accuracy on atypical/indefinite pancreatic FNA samples obtained by endoscopic ultrasonography.
Methods: KRAS mutation analysis in codon 12 was performed in 29 EUS-FNA specimens from patients with an atypical/indefinite cytopathological diagnosis which were subsequently diagnosed as PADC (n = 23) or chronic pancreatitis (n = 6). As controls, KRAS mutation analysis was also performed in histological samples from patients with chronic pancreatitis (n = 10) and pancreatic adenocarcinoma (n = 10). In the latter group mutation analysis was performed also in areas of chronic pancreatitis collected at a distance from the tumour.
Results: In histological samples, significant differences were found between carcinoma vs. non neoplastic tissue ($p = 0.0001$) in terms of KRAS mutation: all tumor samples were mutated, with an allele frequency of mutation ranging from 7% to 36%. Conversely, allele frequency of mutation in pancreatitis samples (associated or not with carcinoma) ranged from 0% to 5%. On this basis, 6% of allele frequency of KRAS mutation was defined as an adequate cut-off to distinguish neoplastic from non-neoplastic lesions.

In FNA specimens obtained at EUS-FNA, mutation rate was constantly <6% in all patients with a final diagnosis of

chronic pancreatitis. In patients with final diagnosis of PADC, the mutation rate of KRAS was >6% in 13/23 (56%) patients. **Conclusion:** Our preliminary data suggest that in case of atypical/indefinite diagnosis on FNA of pancreatic solid lesions, KRAS mutation analysis may be useful in strongly suggesting a diagnosis of PADC.

FOS311
DOES RADIOFREQUENCY ABLATION POSITIVELY IMPACT ON DISEASE PROGRESSION IN PATIENTS AFFECTED BY LOCALLY ADVANCED PANCREATIC CANCER? RESULTS FROM 134 CONSECUTIVE CASES

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Introduction: Around 80% of patients affected by pancreatic cancer are not eligible for radical surgery at time of presentation, due to the presence of local spread of disease or distant metastases. Radiofrequency ablation (RFA) represents a valid therapeutic option as part of the multidisciplinary management of locally advanced pancreatic cancer (LAPC). We investigated the patterns of disease-progression after RFA for LAPC in the largest single-center series available in literature.

Methods: A retrospective analysis of our Institution database was performed between the date February 2007 and June 2011 searching for patients who underwent RFA for histologically proven LAPC (AJCC classification stage III). Demographics, surgical and follow-up data were collected and statistically analyzed. Primary endpoint was progression-free survival (PFS) considered as time between diagnosis and imaging-based evidence of disease-progression. Survival estimations were reported as median and interquartile (IQR) range based on Kaplan-Meier curves and compared using the log-rank test at univariate analysis (a P-value <0.05 was considered significant). Multivariate analysis was carried out using a backward stepwise Cox regression model.

Results: A total of 134 patients meeting the inclusion criteria were enrolled. Overall survival and PFS was 23 (IQR: 12–35; CI95%: 18.4–27.6) and 14 months (IQR: 24–8; CI95%: 12.1–15.9), respectively. Factors associated with a worse PFS resulted: age >67 years (13 vs 20 months; P = 0.010), tumor size >35 mm (12 vs 18 months; P = 0.042), baseline CA 19-9 level >80 U/mL (13 vs 20 months; P = 0.011), upfront-RFA (11 vs 15 months; P = 0.042) and a CA 19-9 level ratio (POD7/baseline) >0.75 (11 vs 16 months; P = 0.039). Multivariate analysis indicated age (HR: 2; CI95%: 1.266–3.343; P = 0.004), tumor size (HR: 1.7; CI95%: 1.038–2.863; P = 0.035) and upfront-RFA (HR: 2; CI95%: 1.228–3.239; P = 0.005) as independent predicting factors for early disease progression.

Conclusion: The prognosis of patients affected by LAPC still remains particularly poor even when chemoradiation alone is provided. However, this study shows that RFA combined to standard palliative therapy may enhance the control of disease progression in selected patients and improve, as a consequence, the quality of life.

FOS312
PALLIATIVE PANCREATICODUODENECTOMY IN PANCREATIC AND PERIAMPULLARY ADENOCARCINOMAS

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Introduction: In this study, we investigated the role of a palliative pancreaticoduodenectomy in pancreatic and periampullary adenocarcinomas by evaluating the surgical risks and survival outcomes with different surgical approaches and resection margins. We provided the incidence of palliative pancreaticoduodenectomy and determined the predictors for resection margin status in periampullary adenocarcinomas.

Methods: Data on patients with periampullary adenocarcinoma who underwent surgery were analyzed. Survival outcomes were compared between resections and bypass operations, and between curative (R0) and palliative resections, with a microscopically (R1) and a grossly (R2) positive resection margin.

Results: There were 595 surgical patients, including 47.4% curative resections (R0) and 17.8% palliative resections (R1 + R2). The positive margin rate after a pancreaticoduodenectomy was 8.0% for a R1 and 19.3% for a R2. For periampullary adenocarcinomas, there was a significant survival difference between the R0, palliative, and no resection groups. However, there was no significant survival difference between the R0 curative resections and the palliative pancreaticoduodenectomies for pancreatic head adenocarcinoma. Note that the survival outcome after either a curative or a palliative pancreaticoduodenectomy was still better than the survival outcome of a bypass operation.

Conclusion: There was a survival benefit after a pancreaticoduodenectomy regardless of the resection margin or primary origin of the periampullary adenocarcinoma, as compared to a bypass operation. The resection margin after a pancreaticoduodenectomy did not play a role in the survival outcome in pancreatic head adenocarcinoma. Therefore, we recommend that pancreaticoduodenectomies should be attempted whenever possible.

FOS313
RADIOFREQUENCY ABLATION OF PANCREATIC CANCER – OVERVIEW

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Introduction: Pancreatic ductal adenocarcinoma (PDAC) is one of the most aggressive cancers with less than a quarter patients being resectable at presentation. Overall 5-year-survival is in single digits. Advances in surgical techniques, critical care, molecular diagnosis, diagnostic imaging, endosonology and adjuvant therapy have been inadequate and there is an urgent need to discover other options that may impact survival. Radiofrequency ablation (RFA) is a thermal ablative therapy that is time tested.

Methods: A review of English literature in PubMed was done using the MESH terms for PDAC and RFA. All the articles were reviewed and core information was tabulated for reference. After a comprehensive review of all articles

the data was evaluated to discover the role of RFA in PDAC management.

Results: Indications, contraindications, feasibility, success rate, safety, complications and impact on survival were reviewed and are discussed further.

Conclusion: RFA appears to be an attractive option for non metastatic locally advanced PDAC. RFA is feasible but has a significant morbidity and there is no evidence to suggest survival benefit. The incorporation of RFA in the multimodal management of PDAC should be yet considered experimental.

FOS314
ANTIBIOTIC PROPHYLAXIS IN ACUTE PANCREATITIS: TO GIVE, OR NOT TO GIVE ...

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Introduction: The antibiotic prophylaxis during acute pancreatitis remains very contraversial topic, therefore the aim of this study was to assess the effects of prophylactic antibiotics and treatment on demand in prospective fashion.

Methods: The population of this study consisted of 210 patients treated for severe acute pancreatitis. Group I (n = 103) patients received prophylactic antibiotics (Ciprofloxacin, Metronidazole). Group II (n = 107) patients were treated on demand according to the bacterial culture results (however, this was not done in randomized fashion but in different management schemes were applied in different cohorts of patients). When infected necrosis of pancreatic tissue was confirmed, ultrasound-guided drainage or surgical debridement of infected necrosis was performed. The primary end points were complication rate, the need and timing of surgical interventions, the incidence of nosocomial infections, and mortality rate.

Results: Ultrasound-guided fine needle aspiration (FNA), Ultrasound-guided drainage (UGD) and open surgical necrosectomy were performed more frequently (24 vs 13, 19 vs 6 and 10 vs 5) and earlier (13.21 ± 8.97 vs 17.23 ± 6.68 and 15.79 ± 10.91 vs 24.50 ± 14.18) in the course of the disease in Group II comparing to Group I ($p < 0.05$). There were no significant ($p > 0.05$) differences between groups, when analyzing incidence of main outcomes and length of stay on surgical ward and intensive care unit.

Conclusion: Our data supports the recommendation to use prophylactic broad-spectrum antibiotics in CT-proven severe necrotizing pancreatitis, as this strategy results in decreased need for interventional and surgical management, decreased number of re-operations, although not affecting the rate of mortality.

FOS315
LONG TERM PANCREATIC FUNCTION AFTER PANCREATODUDENECTOMY WITH PANCREATOGASTROSTOMY AND PANCREATICOJEJUNOSTOMY

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Introduction: Data concerning long-term pancreatic function after pancreatoduodenectomy (PD) is limited. Traditionally, it is supposed that pancreatogastrostomy leads to worse long-term pancreatic function than pancreaticojejunostomy.

Methods: Patients were seen during outpatient follow-up visits at least one year after operation. Exocrine and endocrine pancreatic function were assessed by anamnesis, fecal elastase measurements and oral glucose tolerance testing. Quality of Life and pancreatic morphology were assessed by EORTC QLQ-30/PAN26 and MRI or CT scan, respectively.

Results: Pancreatic function was assessed in 38 patients (26 PG and 12 PJ, age 21–82) operated from 2001 to 2009 with a median follow-up of 3 years. Most frequent indications had been pancreatic ductal adenocarcinoma (32%) and chronic pancreatitis (18%). In total, a high rate of exocrine (90%) and endocrine pancreatic insufficiency (42%) was seen, the majority of which had developed de novo after operation (exocrine 79%, endocrine 29%). Comparing PG and PJ, rates of exocrine insufficiency were similar (PG vs PJ, 89% vs 92%), but rates of de-novo diabetes were higher after PG (PG vs PJ, 35% vs 17%, p = not significant). Quality of life could be considered equal in both groups.

Conclusion: Exocrine pancreatic function is impaired in the overwhelming majority of patients after PD. Endocrine function is less often impaired, but the rate of de-novo diabetes mellitus is still considerable. We found no significant difference between PG and PJ with respect to long-term pancreatic function but higher case numbers are needed to confirm these results. Regular surveillance of pancreatic function for 3 years after operation is recommended.

FOS316
RESULTS AND COSTS ANALYSIS OF PANCREATICODUODENECTOMY IN ELDERLY PATIENTS

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Introduction: It is today accepted that the bad prognosis of pancreatic cancer is life time limiting also in old patients. However, old age is sometimes considered a contraindication for PD due to increased risk of complications and peri-operative costs. The aim of this study is to analyze short and long-term outcome and peri-operative costs in elderly compared to and younger individuals.

Methods: All patients who underwent PD between 2004 and 2010 at Karolinska University Hospital were retrieved

from a prospective data registry and demographics, ASA score perioperative results, length of stay (LOS), costs and survival were analyzed. The cohort was divided by age into elderly (E ≥ 75 years) and younger individuals (Y < 75 years). In total 367 consecutive PDs (201 males/166 females) were identified (E: n = 65; Y: n = 302). The two groups were comparable regarding general characteristics except age (mean O 78.7 vs. 61.5 years) and pre-operative anesthesiological risk (ASA1 + 2: E 49.0 vs. Y 65.2%; ASA 3 + 4: E 51.0 vs. Y 34.8%; p = 0.02).

Results: Comparing E with Y there were no differences in LOS (E 16 vs. Y 16.7 days), overall post-operative complication rate (E 55 vs. Y 57%), severe (Clavien score ≥3b) complications (E 16.9 vs. Y 16.5%), re-operation rate (E 6.1 vs. Y 7.9%), mortality (E: 1.5 vs Y 3.3%) or overall cost (E 30570 vs. Y 32176 Euro). The 1, 3 and 5 year survival rates were comparable between the two groups in patients with pancreatic ductal adenocarcinoma (E: 64.7%, 34.4% and 7.2% vs. Y 71.9%, 31.2% and 22%; p = 0.5). In contrast, a significant difference in 1, 3 and 5 year survival rates was found in patients with other periampullary tumors (E: 81.8%, 43% and 32.3% vs. Y: 87.9%, 69.5% and 62%; p = 0.01).

Conclusion: The current study shows no major differences in perioperative morbidity, mortality or costs between elderly and younger patients, thus PD can be considered safe in elderly patients. Old age is not "prognostic factor" in pancreatic ductal adenocarcinoma, but a negative one for patients suffering from less aggressive periampullary malignancies. On the basis of these results patients should never excluded from a PD based on age only.

FOS317
OUTCOME OF PANCREATIC RESECTION IN OCTOGENARIANS

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Introduction: The increasing aging of the Western population is obviously accomplished by an increasing number of older patients with cancer, including pancreatic cancer. Few Authors evaluated the outcome after resection in patients aged 80 years or older. Aim of this study was to evaluate a single-institution experience of pancreatic resection in patients older than 80 years of age.

Methods: Data were retrospectively collected on patients who underwent pancreatic resection in our Department from 1998 to 2010, divided in two groups: group 1, patients under 80 years of age, and group 2, patients with 80 years of age or older. The two groups were compared in term of demographic features, comorbidities, and surgical procedures. Operative morbidity, mortality, and long-term survival were analyzed. Prognostic variables were investigated, such as stage, grading, lymph node status, radicality of resection. Survival curves were constructed with the method of Kaplan–Meier and compared with Log-rank test; independent prognostic variables were examined with Cox regression analysis. Statistical significance was considered as $p < 0.05$.

Results: There were 518 pancreatic resections: of there 31 patients were 80 years or older (median 82, range 80–86) compared to 487 patients less than 80 (range 45–79). There was no significant difference regarding gender, type of operation, and pathologic findings between the two age groups. No difference was noted in complications rate for younger or older group (31 vs 32%) or mortality rate (2.0% vs 3.2%). In pancreatic cancer patients, overall median survival between the two groups was similar (median 19 vs 16 months; p = 0.86). Tumor's grading and radicality of resection were independent prognostic factors for disease-free survival, while grading and tumor's stage were independent predictors for overall survival.

Conclusion: Pancreatic resection is a safe option for elderly patients. Patients older than 80 years have similar postoperative results and long-term survival compared to younger patients. Age alone should not be considered a contraindication of major pancreatic resection in patients aged 80 years and older.

FOS318
POSTOPERATIVE COMPLICATIONS NEGATIVELY IMPACT ON LONG-TERM SURVIVAL IN PATIENTS AFTER INCOMPLETE RESECTION FOR PANCREATIC HEAD CANCER

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Introduction: Tumor biology, lymph node metastasis, and positive resection margins are known major factors that severely influence early tumor recurrence and survival after resection of pancreatic cancer. Since morbidity rates after pancreas resection are still increased, it remains to be elucidated whether postoperative complications and its severity also impact on the long-term survival after pancreaticoduodenectomy.

Methods: Out of 252 consecutive pancreatectomies performed between 2000 and 2010, 120 pancreatic head resections for cancer were retrospectively analyzed. Postoperative complications were classified on a 5-grades validated scale and were correlated to long-term survival. Grade III and IV complications were defined as severe complications.

Results: Postoperative overall morbidity and severe morbidity were 55% and 28%, respectively. Median overall survival was 1.9 years (mean follow-up of 2.0 years). Significant prognostic factors of survival were T- and N-stage of the tumor and R status of the resection (median survival of 2.4 years for R0 vs. 1.0 year for R1, p = 0.0011). Median survival after severe postoperative complications was decreased from 2.0 to 1.6 years (p = 0.8). Median survival for N0 or N1 tumor, or after R0 resection was not influenced by the occurrence and severity of complications, but patients with a R1 resection and severe complications showed a significantly worsened median survival of 0.8 years vs. 1.8 years without severe complications (p = 0.029).

Conclusion: Long-term survival of patients with incomplete tumor resection is additionally decreased by the presence of severe postoperative complications. In all other patient groups, tumor-related factors such as T- and N-stage are more important risk factors that impact on long-term survival. Nevertheless, minimizing postoperative complications rates represents an important topic in modern pancreatic cancer surgery.

FOS319

"DOUBLE HELIX" PARADIGM IN THE MANAGEMENT OF NECROTISING PANCREATITIS

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Introduction: The treatment of Necrotizing Pancreatitis (NP) has changed significantly over the past few years in the light of new evidence which includes the multicentre Dutch and German studies.

The Aim of this study is to define the current place of Minimally Invasive (MI) and Open Necrosectomy (ON) techniques vis-à-vis Step Up (SU) and Step Down (SD) approaches by analysis of published literature till date.

Methods: Multiple comparison of primary and secondary data obtained by searches of MEDLINE for the time period 1996–November 2011 was done. Studies with original data and facts on outcome were included. Procedures were classified as ON, Percutaneous drainage (PD), Percutaneous Necrosectomy (PN), Endoscopic Necrosectomy (EN), Laparoscopic Necrosectomy (LN) and Retroperitoneal Nephroscopic and Laparostomal (RNL) techniques. There were 57 studies reporting on 898 patients undergoing MI and 1080 patients in major series of ON.

Results: In the PD group of 382 patients 44.4% (170) required another strategy for treatment. Within the EN group 32.43% (63) needed additional intervention. The number of patients cured by endoscopy alone was 75%. Among the LN series of 67 patients 1.65% required reinterventions and 93.5% were cured by it alone. Median number of patients in LN series was 7. PN group had 74 patients of which 72.9% did not require any other modality of management and the average number of reoperations was 3.1 per patient. In the RNL cohort of 240 patients 32.7% were cured by it alone and reoperations per patient was 1.2. In the major ON series, results differed significantly depending on the type of ON. The reoperation range was 5.3–51% and mortality 3–27.3%.

Conclusion: Multidisciplinary management of NP is being practiced more commonly. Neither SU nor SD approaches can be used as a blanket strategy. A policy adapted to the patient's specific needs, based on the anatomic location of the necrosis, clinical comorbidities, and operator experience decides the best approach. A Double Helix paradigm with MI techniques forming one arm, ON forming the other arm and the patients clinical and investigational status forming the bridge between the two arms will help to plan a more flexible stratagem for management of NP.

FOS320

SURGICAL TECHNIQUES PANCREATICOJEJUNOSTOMY AND THE PREVENTION METHOD OF INTRA-ABDOMINAL HEMORRHAGE RELATED TO ANASTOMOTIC LEAKAGE ~ 584 EXPERIENCES IN OUR INSTITUTION

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Introduction: Increased experience has led to a decline in mortality rate after panceraticoduodenectomy (PD), although morbidity rates remain high in experienced centers. Pancreaticojejunal anastomotic leakage (AL) and intra-abdominal hemorrhage (AH) related to AL are the most common major complications. The aim of this study was to evaluate the results of pancreaticojejunostomy (PJ) and the prevention method of AH related to AL in our institution.

Methods: A total of 584 consecutive patients underwent PD between 1965 and 2010. Pancreas is sharply transected with a scalpel, because of intraoperative pathological findings and the confirmation of MPD. The remnant pancreatic stump is sealed by using the VIO soft coagulation system. PJ is undertaken with an end-to-side anastomosis. A mucosal to duct anastomosis is performed between the pancreatic duct, as well as the pancreatic parenchyma and all layers of jejunal using 8 interrupted with 5-0 PDS-II. Single suture between the pancreatic parenchyma and jejunal serosa was performed using 2 interrupted suture with 4-0 prolen. The omental flap is set around the hepatic artery to prevent AH related to AL. Omental flap method was introduced from 2006.

Results: ISGPF grade B/C was identified in 10.9% (64/584) of the patients. Soft pancreatic parenchyma and small pancreatic duct were risk factors of AL ($p < 0.05$). AH related to AL occurred in 2.2% (13/584) from 1965 to 2005. The bleeding source was GDA (45%), stump of pancreas (23%), SMV (8%), MCA (8%) and PHA (8%). All cases of AH were treated with TAE were controlled the bleeding, and liver dysfunction was not present after TAE. We did not experience AH since introduced the omental flap method ($p < 0.05$).

Conclusion: The operative mortality rate after PD has significantly declined due to the progression of surgical techniques and interventional treatments. Pancreatic duct-to-all layer of the jejunal anastomosis was acceptable to prevent the pancreaticojejunal anastomotic leakage. The omental flaps is useful for decreasing the risk of major vascular complications related to pancreaticojejunal anastomotic leakage following PD.

FOS321

A NEW TECHNIQUE FOR PANCREATICOGASTROSTOMY FOR THE SOFT PANCREAS: THE TRANSFIXING SUTURE METHOD

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Introduction: Pancreatic anastomotic leak remains a persistent problem after pancreaticoduodenectomy (PD). The presence of soft, nonfibrotic pancreatic tissue is one of the most important risk factors for pancreatic leak. Accordingly, we devised a pancreas-transfixing suture method for pancreaticogastrostomies in patients with a soft, nonfibrotic pancreatic remnant.

Methods: As for the pancreaticogastrostomy technique, an ultrasonically activated scalpel was used for transecting the pancreas. The inner layer involves a duct-to-mucosa anastomosis with an internal stent and the outer layer involves a single row pancreas-transfixing sutures between the pancreatic remnant and the posterior gastric wall.

Results: A total of 205 consecutive patients underwent pancreaticoduodenectomy with pancreaticogastrostomy. Of the 205 study patients, 137 patients (67%) had a soft pancreas. There were no operative or hospital death. Postoperative complications occurred in 38 patients (19%). Pancreatic leak (Grade B/C) occurred in 4 patients (2%) with a soft thin pancreas.

These pancreatic leaks were managed nonoperatively by maintaining the closed drains.

Conclusion: This technique is simple and appears to reduce the risk of pancreatic leakage possibly by decreasing the risk of suture injury of the pancreas and by embedding the transected stump into the wall of the stomach. This novel pancreaticogastrostomy is an effective reconstructive procedure, especially for patients with a soft, nonfibrotic pancreas.

FOS322

ARVS-ASSOCIATED ACUTE PANCREATITIS PRESENTING TO A REGIONAL HPB UNIT IN SOUTH AFRICA

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Introduction: The incidence of acute pancreatitis (AP) in HIV/AIDs is about 3.2% to 46%. Highly active anti-retroviral therapy (HAART), particularly combinations containing nucleoside analogues, protease-inhibitors, non-reverse transcriptase, hydoxyureas, are the usual agents implicated. However, HI virus itself, other pancreotoxic agents like anti-tuberculous drugs, opportunistic infections, chronic liver and biliary diseases, recreational drugs, hypertriglyceridemia of HAART may play varying roles.

Methods: Retrospective analysis of prospectively collected data of all HIV positive individuals presenting with acute pancreatitis to the HPB Unit at the Chris Hani-Baragwanath Academic Hospital (CHBAH), from January 2006 to December 2011. Stratification of HIV status was according to CDC classification, and the severity of pancreatitis was stratified according to the current modified Atlanta's Classification. Data analysed include demographic, clinical, investigational, management and outcome results.

Results: Twenty seven individuals (15 men, 12 women; median age 39 years, range 26–63 yrs) with HIV or HIV/AIDs were managed for acute pancreatitis during the reference period. Mild AP occurred in 16 patients, whilst 11 presented with severe AP. Generally, AP occurred following commencing stavudine-containing anti-retroviral combinations in 18 individuals, protease inhibitors in combination with stavudine or didanosine in 9. Secondary possible agents found in 17 individuals include anti-tuberculous agents (5), ethanol use (5), gall stones (3), opportunistic infections (2), sulphonamide-trimethoprim (2). Acute pancreatitis occurred within two months of commencing ARVs in 10 individuals, within six months in 8, twelve months in 5, more than twelve.

Conclusion: In this analysis, mild AP occurred in most of the patients. Stavudine, didanosine and pentamidine-containing combinations were the commonest pancreotoxic agent associated with AP in the cohort. Although severe pancreatitis remains highly fatal in HIV/AIDs individuals, local pancreatic complications can easily be managed by minimally invasive means. Nevertheless, acute pancreatitis in the HIV/AIDs individual can be adequately managed as in the non-HIV positive population.

FOS323

EXTENDED RESECTION AND HIGHER AGE DO NOT INFLUENCE RESULTS OF PANCREATICODUODENECTOMY IN A DUTCH TERTIARY REFERRAL CENTER

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Introduction: Portal vein involvement and higher age are no longer absolute contra-indications for pancreaticoduodenectomy (PD) in patients with suspected malignancy of the pancreatic head and periampullary region. We aimed to evaluate the surgical and oncological outcome of PD for potentially resectable pancreatic or periampullary tumors in a Dutch tertiary referral center and the impact of extended resections and high age on procedural morbidity, mortality and survival.

Methods: Retrospective, partly cross-sectional study in a Dutch tertiary referral center. Postoperative complications were graded according to the ISGPS definitions and Clavien-Dindo classification. General practitioners and oncologists were contacted to determine survival. Subgroup analysis was performed for patients who underwent an extended PD because of tumour involvement and patients >69 years. Between 2007 and 2010, 115 consecutive patients underwent an explorative laparotomy. In 101/115 patients (88%) the tumor could be resected by (extended) PD. An extended-PD was performed in 18/101 patients (vena portae, n = 11; total pancreatectomy, n = 5; splenectomy, n = 3; right

hemicolectomy, n = 3; left hemicolectomy, n = 1), 34/101 patients were >69 years.

Results: A R0-resection was obtained in 73/90 patients (81%) with a histologically confirmed malignancy. Pancreatic fistulas (grade B/C) were observed in 8/101 patients. The 30-days mortality was 4% and the in-hospital mortality 5%. 45/101 patients were diagnosed with pancreatic adenocarcinoma with 1- and 2-year survival rates of 67% and 37%. Mortality in patients with extended resection was 0% and the 1-year and 2-year survival for pancreatic adenocarcinoma (76% en 38%) were comparable to patients with a standard resection. Mortality in patients older than 69 years was non-significantly increased (9% vs 3%; p = 0.33) but the 1-year and 2-year survival rates in patients with pancreatic adenocarcinoma (71% en 38%) were comparable to younger patients.

Conclusion: In the setting of a Dutch high-volume center, R0-resections can be achieved in over 80% of potentially resectable cases due to (extended) PD. Extended-PD can be performed with similar surgical and oncological outcomes as standard PD. In elderly patients postoperative mortality may be a concern but adequate survival benefit can be achieved.

FOS324
AUTOIMMUNE PANCREATITIS: PRESENTATION OF A SERIES OF TWO SPANISH HOSPITALS, TREATMENT AND LONG-TERM RESULTS AFTER DIAGNOSIS

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Introduction: AIP is a rare disease that can mimic a pancreatic cancer (PC). Clinical picture is a painless obstructive jaundice. CT/MRCP shows typical images: global enlargement of the pancreas, irregular narrowing of the pancreatic duct and biliary duct dilatation. However "focal type" is difficult to distinguish from PC. It is essential to consider this disease and only histology or response to steroids gives the clue. We present our experience in the diagnosis, treatment and follow-up.

Methods: From 1999 to 2011 we collected 15 patients (p) (10 M/5 F). Before 2003 4 p were detected with pathological review of pancreaticoduodenectomy (PD) without PC. Four were referred with biliary stents without pathological diagnosis. Another was sent after a bilio-entery bypass because was considered to have an advanced PC. One were considered advanced PC and treated with a stent. Steroids were given in 5 p but one did not respond and was resected. In 1 p AIP was suspected intraoperatively and a core biopsy changed the strategy to a bypass procedure. Eight p were diagnosed after PD, 1 died in the postoperatory period. From 2003 EUS/CT-biopsies were performed in all p to exclude PC and possibly to confirm diagnosis before steroids treatment.

Results: Mean age was 50.9 y (24–75). Progressive or self-limited obstructive jaundice was present in all p. CT and MR images showed diffusely enlarged gland (6 p) or pseudotumour (9 p). We detected elevated IgG4 in 4 p. Only 1 p had a rheumatoid arthritis associated. Two p were diagnosed with biopsy, one by EUS and one intraoperatively. Three p were treated with steroids empirically and jaundice disappeared dramatically. Mean follow-up was 71.6 months. Only 1 p had recurrence of AIP associated with increased levels of IgG4 and he responded to steroids. Another 2 p presented autoimmune cholangitis, 1 p was succesfully treated with steroids. De novo diabetes was detected in 6/14 p. Non resected p have a better quality of life.

Conclusion: AIP can be suspected in p with obstructive jaundice and typical images in TC/MR, in addition high levels of IgG4 and a positive biopsy. If only 1 criteria can be found, biopsies are mandatory to ruled out PC. In case of suspicion, a trial of steroids must be tried and resolution of jaundice is considered as a diagnostic test. Although pancreatic surgery is safe, must be indicated only in cases of doubt of PC. Long term follow-up is mandatory because the risk of recurrence (3/14).

FOS325
SURGICAL TREATMENT OF PANCREATIC INSULINOMA: 45 YEARS EXPERIENCE IN A SINGLE CENTER

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Introduction: Insulinoma is the most common functioning neuroendocrine tumor of the pancreas. Over 90% of the insulinomas are benign and single. Depending on the location within the gland, they can be enucleated, or treated with a partial or distal pancreatectomy or rarely with a pancreaticoduodenectomy (PD).

Methods: We reviewed clinical data of patients observed in our Department for organic hyperinsulinism from January 1966 to December 2010 (follow-up to June 2011). We observed 102 patients with organic hyperinsulinism, 60 F/42 M, averaging 49.5 years. We observed 7 cases of hyperplasia/nesidioblastosis. Among insulinomas, 7 had multiple tumors and 7 were malignant. The lesions were respectively located: 32 in the pancreatic head, 21 in the body, 33 in the tail, 8 in the isthmus, 5 lesions involved the whole pancreas, 1 was located in the left ovary and in 2 cases the site was unknown (one lost in follow-up). 7 patients didn't undergo surgery, 4 had previous surgery elsewhere and in 5 cases a second operation was needed.

Results: We performed 39 enucleations, 38 left pancreatectomies (26 spleen preserving), 1 left pancreatectomy and enucleation of adenoma in the head, 6 middle pancreatectomies, 3 duodenum preserving pancreatic head resections, 2 PD, 2 near total pancreatectomies, 1 total pancreatectomy, 1 left ovariectomy, 2 explorative surgery. Perioperative mortality was 5/95 (5%): there were 3 acute pancreatitis, 1 stroke and 1 disseminated intravascular coagulation. Perioperative morbidity was 23/95 (24%): we observed

3 acute pancreatitis, 13 pancreatic fistulas, 2 abdominal abscesses, 2 abdominal fluid collections, 2 pseudocysts and 1 biliary leakage. Excluding the malignant cases and the postoperative deaths, 85/87 patients were cured after surgery.
Conclusion: Surgical treatment of hyperinsulinism in our 45 years-long experience resulted in high rate of cure; however morbidity and mortality related to treatment are still observed despite the progress in tumor detection and treatment in the last 25 years.

FOS326
LEFT PANCREATECTOMY FOR NEUROENDOCRINE PANCREATIC TUMORS: RESULTS OF OPEN SURGERY IN 30 YEARS

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Introduction: Neuroendocrine pancreatic tumors (NPT) are often localized in the body-tail of the pancreas. Left pancreatectomy (LP) is the procedure of choice and can be performed either with splenectomy (DP) or with a spleen-preserving procedure (SPLP). The aim of this study was to retrospectively evaluate postoperative complications and clinical outcome of patients submitted to laparotomic left pancreatectomy for pNET in our Unit in the last 30 years.
Methods: We reviewed clinical data of patients who underwent laparotomic LP for NTP from January 1981 to December 2010, evaluating staging, type of surgery, early and late complications, follow-up (FU) and disease free survival (DFS). We observed 216 patients affected by NPT: among them, 123 tumors were localized in the body-tail of the pancreas and 69 patients underwent laparotomic LP. We excluded 5 patients who also underwent enucleation of a lesion in the head and 5 in whom the NPT was an incidental finding. We enrolled 59 patients (29 F/30 M; mean age 53.8 yrs). Patients were grouped according to the WHO 2000 and TNM 2010 classifications. We had 33 benign tumors (55.9%), 5 uncertain behaviour tumors (8.5%) and 21 malignant lesions (35.6%).
Results: We performed 29 DP (49.2%), 28 SPLP (47.4%, 23 cases with splenic vessels preservation) and 2 left pancreatectomy in previous splenectomy (3.4%). DP was performed when a malignant tumor was evident (65.5% of cases). SPLP was performed for benign lesions in 93% of cases. Mortality was 3.9% and morbidity was 42.4%, equally distributed in DP and SPLP groups. We had 10 pancreatic fistulas (16.9%, 6 in DP and 4 in SPLP group), 8 abdominal fluid collections, 5 pseudocysts (8.5%, 4 in DP group) and 2 splenic infarctions in SPLP with splenic vessels ligation (2/5 of Warshaw operation). Mean FU was 111.2 months (range 10–338), mean DFS was 120.7 months and in the 12 patients with metastatic disease mean time to progression was 30.7 months.
Conclusion: Laparotomic left pancreatectomy in NPT can be performed with or without splenectomy. The complication rate is still high and it is comparable between the two surgical procedures.

FOS327
RESECTION OF THE HEAD OF THE PANCREAS: OF WHAT IMMEDIATE AND LONG TERM RISKS SHOULD PATIENTS BE INFORMED?

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Introduction: Whipple Procedure (WP) is a quite frequent surgery, mainly performed to treat periampullar pathology. Although mortality has decreased in last years, morbidity remains high, and functional sequelae can be observed. The objective of this study was to analyse the mortality, morbidity, and long-term consequences of WP, in order to better inform patients of the actual risk of this surgery.
Methods: Retrospective cohort study of 367 consecutive patients operated in a single specialized center (>25 WP/year) between 1992 and 2011. The average age of patients was 61 years and 62% were men. Surgical procedure consisted in a pancreatico-gastric anastomosis in 89.5% cases, a pylorus preserving in only 6.6% of cases. Histological examination showed that most frequent diseases were: pancreatic cancer (43.3%), ampulloma (15.8%), chronic pancreatitis (9.3%), distal common bile duct cancer (8.2%) and duodenal cancer (5.2%). Postoperative morbidity and mortality (during hospitalisation or within 30 days of operation), and long term follow-up data were collected and analyzed.
Results: 71% of WP were done for cancer, with 61% of positive lymphadenectomies. The average number of lymph nodes resected was 16. Venous resection was needed in 15% cases. The median length of stay was 15 days. Mortality rate was 1.4% and morbidity 64%. 10% patients required reoperation. Postoperative complications were pancreatic fistula (19%), but 57% of them were grade A. Wound infection (19%), delayed gastric emptying (17%), and pulmonary morbidity (13%) were frequent, while bleeding (8%), acute pancreatitis (5%) and bile duct leakage (3%) were rare but serious. When assessed by Clavien's classification, grades1 and 2 were 75% of morbidity. Long-term follow-up of 146 patients showed new onset of diabetes mellitus in 15% and 71% experienced steatorrhea.
Conclusion: Whipple Procedure is a safe surgery, associated to less than 1.5% mortality when practiced in a specialized center. Moreover, even if postoperative morbidity remains high, it is benign in 75% of cases. During follow-up, most patients will be treated for exocrine insufficiency (>70%) but few will develop de novo diabetes (15%).

FOS328
SPLEEN PRESERVING DISTAL PANCREATECTOMY WITH AND WITHOUT SPLENIC VESSEL LIGATION: A SYSTEMATIC REVIEW

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Introduction: Splenic preservation during distal pancreatectomy may be performed with splenic vein and artery

ligation, relying on short gastric blood flow (Warshaw's Technique (WT) or by preserving the splenic artery and vein, and dividing small branches to the distal pancreas (Splenic vessel preservation (SVP). WT may allow for a faster and less technically challenging procedure than SVP, however it may be associated with more splenic complications. The consensus on which approach is best, is divided.

Methods: A systematic review of the evidence in the literature was undertaken with the aim of analysing the merits and disadvantages of both WT and SVP. A systematic search was undertaken of the medical literature using the electronic databases Medline, Embase, Pubmed, and the Cochrane Library from 1985–2011. All comparative studies were included for analysis and case series of >5 reported cases. Non-English papers, individual case reports, case series <5, technical reports, reviews, animal and cadaveric papers were excluded. The remaining articles were reviewed by 2 reviewers considering study design, baseline characteristics, surgical technique undertaken, outcomes and complications.

Results: Of 547 articles identified, 23 met the inclusion criteria. Of these, 2 papers were direct comparisons of WT and SVP. In total 335 patients underwent WT and 441 underwent SVP. There was no significant difference in the mean operating time between WT and SVP (188 mins vs 216 mins respectively) or in the mean estimated blood loss (330 ml vs 259 ml). Splenic infarction was more common with the WT than SVP ($n = 51$ vs $n = 2$, $p < 0.01$), however intra-abdominal abscess requiring intervention was similar in both groups (10 vs 11, ns). Splenic varices were significantly higher in the WT group (8.3% vs 0% $p < 0.0001$). Post-operative splenectomy was required in 7 WT patients (2%) compared to 0 (0%) in the SVP group ($p < 0.02$).

Conclusion: Splenic preserving distal pancreatectomy can be performed with low complication rates. Whilst Warshaw's Technique is thought to be technically less challenging, this was not demonstrated by a difference in either operating time or blood loss. Splenic complications, although low with Warshaw's Technique, are significantly higher than with splenic vessel preservation.

FOS329
TOTAL ROBOTIC PANCREATICODUODENECTOMY

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Introduction: The daVinci surgical system reintroduces much of the operative dexterity lost during laparoscopic operations and offers the unique opportunity to verify if pancreaticoduodenectomy (PD) can be safely performed through a minimally invasive approach. We herein report our technique for total robotic PD employed in 29 consecutive patients. This experience was earned at a high-volume center of pancreatic surgery, having extensive experience in advanced laparoscopy and robotic surgery.

Methods: Our technique for total robotic PD is unique in several respects: (1) Pure laparoscopy is not used at any stage. (2) Only the right colonic flexure is mobilized. (3) A total of five ports are used. (4) The camera port is placed along the right pararectal line to allow optimal view of the uncinate process (UP). (5) The third robotic arm, driven by the surgeon's right hand, is placed on the patient's left side. It is used to "hang" the duodenum during dissection of the UP, and as the main operative arm. (6) The gallbladder is used to retract the liver. (7) In preparation for dissection of the UP, the first jejunal loop is fully mobilized but it is not sectioned until the specimen is ready for removal, to facilitate jejunal rotation behind the mesenteric vessels.

Results: No PD was converted to open surgery or conventional laparoscopy, despite 2 patients required segmental resection of the mesenteric vein and reconstruction by a jump graft. The entire stomach was preserved in 25 patients. Mean operative time was 568 minutes (420–960). Thirty-day operative mortality was nil. No pseudoaneurysm of the gastroduodenal artery was noted. Despite nearly all pancreas were soft and with small ducts (≤3 mm), only 3 patients developed grade B pancreatic fistulas and none grade C fistulas. Mean hospital-stay was 21.8 days (10–60). Fifty-one percent of the patients were diagnosed with malignant tumors. Overall, the mean number of lymph nodes retrieved was 29.8 ± 16.7. None of the margins was positive.

Conclusion: In selected patients total robotic PD is feasible. As compared to hybrid techniques, coupling laparoscopic dissection with robotic reconstruction, a total robotic procedure spares unnecessary dissections and allows optimal control of large peripancreatic vessels permitting segmental vein resection and tailored reconstruction. Technology refinements and improvement of surgical technique could make robotic PD an appealing alternative to open PD in selected patients.

FOS330
MINIMALLY INVASIVE PANCREATIC NECROSECTOMY IN THE ACUTE SETTING

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Introduction: Traditional surgical approaches to pancreatic necrosis are associated with significant morbidity and mortality and increased risk of major organ dysfunction. This has led to search for new, innovative and minimally invasive techniques for debridement. This study reports a series of patients undergoing pancreatic necrosectomy with the minimally invasive approach.

Methods: A total of twenty patients (twelve males and four females; age group 19–69 years; mean age 41 years) with necrotizing pancreatitis (50–90% necrosis on CT) underwent minimally invasive necrosectomy between 2007 and 2010. Two to five ports were used. Laparoscopic necrosectomy was performed by transperitoneal approach in fourteen patients and by retroperitoneoscopy in six patients. Transperitoneal access was through the gastrocolic ligament in all cases and through the left flank in cases of retroperitoneoscopy. Four patients had associated pancreatic abscess for which drainage was done. Necrosectomy was done by blunt dissection using suction-irrigator followed by thorough lavage. Two to four drainage tubes were kept as per requirement.

Results: There was evidence of preoperative organ dysfunction in six patients. All patients tolerated the procedure

well. There was no postoperative mortality or conversion to open necrosectomy. The mean operative time was 130 minutes. There were no major postoperative complications attributed to the surgery. Two patients developed respiratory distress with ARDS causing prolonged stay in ICU and delay in discharge. One patient underwent relaparoscopy for persistent sepsis with intra abdominal collection while another was managed with percutaneous USG guided drainage. The mean stay in ICU was 3 days with postoperative hospital stay of 8 days. Most patients were discharged with drainage tube in situ which was removed after one week at follow up.

Conclusion: Minimally invasive approach to pancreatic necrosectomy is safe and feasible with good outcomes in centres of laparoscopic excellence. It requires careful patient selection and appropriate skills. Further studies are awaited.

FOS331
MULTIVISCERAL PANCREATIC RESECTIONS: ARE THEY WORTH THE RISK?

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Introduction: As mortality rates associated with pancreatic surgery decrease, there has been an increasing drive towards extended resections for locally invasive pancreatic disease; however, the impact of multivisceral resection on morbidity, mortality, and survival remains inconclusive.

Methods: An IRB-approved retrospective chart review was conducted on all patients who underwent a pancreatic resection by a single surgical oncologist at our institution between July 2004 to July 2011. Patients were grouped into 4 categories based on extent of resection: standard pancreaticoduodenectomy (SPD), multivisceral pancreaticoduodenectomy (MVPD), standard distal pancreatectomy (SDP), and multivisceral distal pancreatectomy (MVDP). Collected variables included demographics, length of stay, operating room (OR) time, postoperative morbidity and mortality, and median survival.

Results: 191 patients were included, with 143 undergoing standard resection and 48 multivisceral resection. No significant difference was seen in demographics. MVPD vs. PD was associated with a longer OR time (361 vs. 299 min, $p < 0.0001$) and a higher incidence of positive margins (47.8% vs. 25%, $p = 0.03$) without a significant difference in morbidity. MVDP vs. DP demonstrated a longer length of stay (13 vs. 6 days, $p < 0.0001$) and OR time, with increased rates of abscess formation (24% vs. 5.4%, $p = 0.03$) and gastroparesis (36% vs. 5%, $p = 0.002$). No difference in 30-day or in-hospital mortality was seen. However, Kaplan Meijer survival analysis demonstrated an inferior median and overall survival in the multivisceral group.

Conclusion: Our results demonstrate that although multivisceral pancreatic resections may be performed with acceptable morbidity and mortality in the appropriate patient population with locally advanced disease, a survival benefit has not been proven.

FOS332
BILIARY COMPLICATIONS AFTER PANCREATICODUODENECTOMY

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Introduction: The aim of the study was to determine the incidence of bile leak (BL) and biliary strictures (BS) after cephalic or total pancreaticoduodenectomy (PD), and to study the management of these complications.

Methods: Between April 2005 and September 2011, 397 PD were performed (383 cephalic PD and 14 total PD) in 2 centers. We reviewed the biliary complications from a prospective database.

Results: A) Thirteen patients (3.3%) presented a BL. It was revealed by bile in the drain (54%), biloma (23%) or peritonitis (7%). In six patients (46%), BL dried out spontaneously; 2 (15%) had a radiologic procedure, and 5 (38.5%) underwent surgery. No patient having had a BL then developed a BS.

B) Seventeen patients (4.3%) developed a BS, 15 after cephalic PD (NS). Four patients (24%) had a malignant recurrence. Among the 13 other patients, 7 had a bile duct (BD) of 6 to 10 mm, and 6 had a thin BD (<5 mm). There was no inflated BD (>10 mm). Fifteen BS were first treated by endoscopic or radiologic procedures (ERP), and 2 BS had a medical treatment. Three patients had a redo of the anastomosis 16 days, 5 and 9 months after respectively 2, 3 and 2 ERP.

Conclusion: BL and BS were rare after PD. Directed low-flow BF didn't need any specific treatment. A BL wasn't a promoting factor of BS. BS happened either in cases of malignant recurrence (24%) or when BD were normal or thin. 18% of the BS led to the redo of the anastomosis.

FOS333
DEVELOPMENT OF DIABETES AFTER PANCREATECTOMY: PROSPECTIVE ANALYSIS

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Introduction: Pancreatectomy is major treatment modality for various pancreas and periampullary diseases. But true development rate of DM after pancreatectomy is not established, especially by prospective serial data and regular interval follow up.

Methods: From 2007 to 2011, we analysed 120 pancreatectomy patients with at least 1 year follow up, and the exclusion of preoperative DM patients. Data collection was done five times at preoperative, discharge, post-operative 3 months, post-operative 6 months and post-operative 12 months as scheduled. Fasting glucose sugar (FBS), oral glucose tolerance test (oGTT) and HbA1c were checked. And clinical and pathologic data were collected and analyzed to find out influencing factor of development of diabetes after

pancreatectomy. Diabetes was diagnosed in this study by criteria of ADA with at least 2 times positive test result.
Results: Patients with DM by definition of WHO increase to post-operative 6 month follow up and decrease at post-operative 12 month follow-up (18.8, 18.8, 23.9, 20.0; % of total numbers, respectively discharge, 3 month, 6 month, 12 month). All clinical and pathologic demographics between post-pancreatectomy no DM group and post-pancreatectomy DM group. Post-pancreatectomy DM group were older (62.1 ± 8.8) than no DM group (58.4 ± 11.7). And it reveals that distal pancreatectomy increase post-pancreatectomy DM (odds ratio: 2.59). Adjuvant therapy, chronic pancreatitis and alcohol drinking history could not show significant effect on post-pancreatic DM development.($p < 0.05$).
Conclusion: Post operative DM developed in 20.0% of the patients (24/120). And distal pancreatectomy increase risk of post pancreatectomy DM development with odds ratio of 2.59.

FOS334
LAPAROSCOPIC SPLEEN-PRESERVING DISTAL PANCREATECTOMY: SPLENIC VESSELS PRESERVATION VERSUS WARSHAW'S TECHNIQUE

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Introduction: Laparoscopic spleen-preserving distal pancreatectomy (LSPDP) is a safe, feasible and increasingly performed procedure.

The value of preservation compared to the sacrifice of the splenic vessels remains unclear.

The purpose of this study was to compare the preservation to the ligation of the splenic vessels as surgical management of laparoscopic spleen-preserving distal pancreatectomy.
Methods: From January 1997 to January 2011, a bi-centric retrospective study was performed from patients underwent laparoscopic distal pancreatectomy with spleen conservation for benign and low-grade malignant tumours in the body-tail of the pancreas. Patients treated with an intent-to-treat basis of splenic vessels preservation (group SVP) were compared to patients treated with an intent-to-treat basis of division of the splenic vessels (group WT). Clinicopathological features, operative and postoperative outcomes were assessed until 30 days after surgery or during the hospital stay.
Results: Fifty-five LSPDP were analysed in the group SVP and 85 in the group WT. The main final histological diagnoses were cystic neoplasm (38%) and neuroendocrine tumour (31%). Clinical characteristics were similar in both groups except for tumour size, significantly greater in the group WT (33.6 vs 42.5 mm, $P < 0.001$).

Operative time, blood loss and conversion to open rate did not differ between the 2 groups. The rate of spleen conservation was better with the splenic vessels preservation (96.4% vs 84.7%, $P = 0.03$). The preservation of the splenic vessels succeeded in 75%. Splenic related complications only occurred in the group WT (0 vs 19%, $P < 0.001$) and mean length of hospital stay was statistically shorter in the SVP group (8.2 vs 10.5, $P = 0.01$).
Conclusion: The preservation of the splenic vessels brought the best rate of spleen conservation without increased morbidity. The short-term benefits associated with the preservation of the splenic vessels should lead to prefer this technique for laparoscopic spleen-preserving distal pancreatectomy in selected patients with benign or low-grade malignant tumours in the body-tail of the pancreas.

FOS335
HAS SURGICAL MANAGEMENT OF NEOPLASTIC CYST OF THE PANCREAS IMPROVED OVER TIME? TRENDS IN THE OUTCOME AND PATHOLOGY IN A SURGICAL SERIES

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Introduction: With the widespread use of cross-sectional imaging in the work-up of abdominal conditions the incidental finding of a pancreatic cyst has become commonplace. Indeed, the prevalence of pancreatic cysts identified on imaging has increased over time from 0.21% with transabdominal ultrasound in 1994, to 2.6% with CT in 2006, and 13.4% with MRI in 2010. The aim of this study was to determine if there has been a change in the surgical management and pathological findings of pancreatic cysts over time.
Methods: Patients who underwent resection of a pancreatic cyst were identified from our prospectively maintained pancreatectomy database. For purposes of comparison of time-related trends, patients were divided into two groups – 1996–2001 (group 1) and 2006–2011 (group 2). Cysts were categorized as follows: pseudocyst (PS), serous cystadenoma (SCA), intraductal papillary mucinous neoplasm (IPMN), mucinous cystic neoplasm (MCN), solid psuedopapillary neoplasm (SPN), lymphoepithelial cyst (LEC) and neuroendocrine tumors (NET). General demographics, pathology and surgical procedure were documented and the prevalence of the resected cysts was compared between the two time periods using Fisher exact and chi-square tests.
Results: 576 patients underwent resection of a cystic lesion – 190 in group 1 and 386 in group 2. The pathological findings were: PS ($n = 22$), SCA ($n = 87$), IPMN ($n = 309$), MCN ($n = 48$), SPN ($n = 34$), LEC ($n = 12$) and NET ($n = 6$). There was a increase in the number of resections for IPMN from 43.7% ($n = 83$) in group 1 to 223 (57.8%) in group 2 ($p = 0.001$) and a decrease in the resection of benign cysts – 30.5% to 22.5% ($p = 0.04$) for SCA and 6.8% to 2.3% for PS ($p = 0.01$). The proportion of resected IPMN with high grade dysplasia did not change over time (25.3% to 21.4%; $p = 0.32$), however, there was a significant decrease in the proportion of IPMN with invasive adenocarcinoma (56.6% to 29.3%; $p < 0.001$) and an increase in low or moderate dysplasia (18.1% to 49.3%; $p < 0.001$).
Conclusion: The type of pancreatic cyst undergoing resection has changed significantly over the past 15 years. The ability to identify benign cysts has improved with fewer

undergoing resection. The numbers of patients with IPMN undergoing surgical resection has increased, with lesions removed at an earlier stage of disease. These findings suggest new tools and guidelines are required to identify those patients with low or moderate dysplasia who could undergo surveillance rather than surgical resection.

FOS336
EARLY TUMOR RECURRENCE FOLLOWING SUPERIOR MESENTERIC-PORTAL VENOUS RESECTION (SMV-PV) IN PANCREATIC ADENOCARCINOMA IS ASSOCIATED WITH TRANSMURAL VENOUS TUMOR INVOLVEMENT AND A POSITIVE RESECTION MARGIN

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Introduction: Long-term survival in patients with pancreatic adenocarcinoma requires compete tumor resection and timely adjuvant therapy. In certain situations, tumor resection requires en-bloc removal and reconstruction of the superior mesenteric portal venous (SMV-PV) confluence. In this setting, patient selection is critical to maximize long-term disease free survival. This study examines variables associated with early tumor recurrence following en-bloc SMV-PV resection.

Methods: With IRB authorization, 52 consecutive patients over a 6 yr. period (2005–2011) with locally advanced pancreatic adenocarcinoma had en-bloc SMV-PV resection and reconstructions were retrospectively reviewed. There were 6 (11.5%) perioperative deaths (90-day), 12 (23%) long-term (>2 yrs.) survivors, and 15 (29%) patients with early tumor recurrences. We compared the long-term survivors (N = 12) to the patients with early tumor recurrence (N = 15) for multiple preoperative, intraoperative, postoperative and histopathologic variables. Standard statistical tests were applied for nominal and ordinal variables.

Results: We identified no differences between those with early tumor recurrence and long-term survivors in patient demographics, use of neoadjuvant chemoradiotherapy, preoperative EUS staging, operative time, estimated blood loss, histopathologic tumor grade, final AJCC pathologic staging, postoperative complications, hospital length of stay, or use of adjuvant therapy. Patients with early tumor recurrence had a higher incidence of venous transmural tumor involvement [53% (8/15) vs. 0%, p-value = 0.003], poor differentiation on histological examination [67% (10/15) vs. 25% (3/12), p-value = 0.05], and/or a positive histologic resection margin (R1 resection) [33% (5/15) vs. 8% (1/12), p-value = 0.18].

Conclusion: Early tumor recurrence is associated with transmural venous tumor involvement, poor differentiation on histological examination, and/or a positive histologic resection margin. In pancreatic adenocarcinoma, en-bloc tumor resection with SMV-PV reconstruction has an 11.5% 90-day perioperative mortality rate. Careful intraoperative assessment and judgment should be exercised to optimize patient selection for a resection which carries a substantial perioperative mortality.

FOS337
SIMULTANEOUS PANCREATECTOMY AND COLECTOMY: A SAFE COMBINATION?

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Introduction: Postoperative complication rates following pancreatectomy remain high in the modern era. Substantial surgical procedures performed with pancreatectomy may result in additional postoperative morbidity and mortality. The aim of this study was to analyze the complications which occur after simultaneous pancreatectomy and colectomy.

Methods: All cases of regional pancreatectomy (P), segmental colectomy (C), and simultaneous pancreatectomy and colectomy (P + C) were reviewed at a single high-volume institution between November 2006 and May 2011. All cases were monitored with complete 30-day outcomes through the American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP). Two and three-way statistical analyses were performed among the operation categories.

Results: The median age for patients undergoing P + C was 54 yrs. Within the P + C group, pancreatoduodenectomy was performed in 9 patients, and distal pancreatectomy in 11. 30-day mortality was 10% for the P + C group (9% distal pancreatectomy, 11% pancreatoduodenectomy, p = NS). Postoperative complications were recorded in 70% of patients undergoing P + C versus 33% in patients after pancreatectomy alone, $p < 0.01$. Deep organ space infection occurred in 45% of the P + C patients compared to 10% of the pancreatectomy patients, $p < 0.01$. Superficial surgical site infection occurred in 15% of the P + C patients versus 10% in the P and C groups, $p = 0.31$. The median postop hospital stay was 17 days (range, 6–60 days) for P + C patients compared to 7 and 6 days for P and C patients, respectively ($p = 0.01$).

Conclusion: Extraordinarily high complication rates are observed after simultaneous regional pancreatectomy and colectomy which exceed the cumulative morbidities after each operation separately. Careful patient selection and strategies to prevent and/or control anastomotic leaks are necessary to improve outcomes in these patients.

FOS338

SARCOPENIA, A QUANTIFIABLE MEASURE OF FRAILTY, PREDICTS SHORT-TERM OUTCOMES IN PATIENTS UNDERGOING PANCREATICODUODENECTOMY

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Introduction: Sarcopenia, or loss of skeletal muscle mass, is one component of frailty and physiological reserve. Sarcopenia is objectively quantified by morphometric measurement of skeletal muscle on cross sectional imaging. The aim of the study is to evaluate the influence of sarcopenia on outcome of pancreaticoduodenectomy.

Methods: Sarcopenia was assessed by measuring psoas muscle density (PMD) and total psoas area (TPA) by pre-operative abdominal computed tomography in 209 patients in a standardized fashion. Pre-operative factors evaluated were age, gender, race, pre-operative involuntary weight loss (categorized as <5% – pre-cachexia and >5% – cachexia), body mass index (BMI), Charlson comorbidity index (CCI), American Society of Anesthesiologist (ASA) status, and serum albumin. Outcome variables evaluated were post-operative complications graded per Accordion classification (major defined as >level 3), length of stay (LOS), 90-day readmission rate and overall survival. Logistic regression modeling was utilized to determine the effect of sarcopenia.

Results: Of 209 patients, 48% were males, median age was 66 years and 43% were cachectic. Overall post-operative complication rate was 68%; 28.7% had major complications. 90-day readmission rate was 35%. On multivariate analysis, mean PMD was a statistically significant predictor of length of stay ($p = 0.002$). ASA, cachexia and CCI were not. Regarding readmission, age, ASA, BMI and mean PMD were statistically significant factors on univariate analysis. However, after adjusting for other predictive indices, mean PMD was the only factor independently associated with 90-day readmission ($p = 0.03$). Advance age was associated with higher morbidity ($p = 0.02$). Neither sarcopenia nor other predictive indices were statistically associated with overall survival.

Conclusion: Sarcopenia, an objective measure of frailty, correlates strongly with post-operative outcomes especially longer hospital stay and higher readmission rate after pancreaticoduodenectomy. However, sarcopenia does not influence oncological outcome. Further studies are needed to evaluate the relationship between frailty utilizing sarcopenic measurements and post-operative outcomes in patients undergoing pancreaticoduodenectomy.

FOS339

IMPACT OF PERI-OPERATIVE COMPLICATIONS ON LONG-TERM SURVIVAL AFTER PANCREATICODUODENECTOMY FOR DUCTAL ADENOCARCINOMA

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Introduction: Complications after major pancreatic resection, particularly an anastomotic pancreatic leak, result in major morbidity and a prolonged hospital stay. The aim of this study was to determine whether peri-operative complications affect long-term survival after pancreaticoduodenectomy (PD) for pancreatic ductal adenocarcinoma (PDCA).

Methods: Our unit is a tertiary referral centre for HPB surgery and performs over 100 elective pancreatic resections per annum. Patients presenting with ductal adenocarcinoma follow a standard management algorithm and all investigations, surgical procedures, pathology and complications are documented on a prospectively maintained database. All patients undergoing pancreaticoduodenectomy between 2002–2009 were identified. Post-operative complications and pancreatic leaks were graded according to the Clavien classification and the International Study Group on Pancreatic Fistula (ISGPF) definition respectively.

Results: 486 PD were performed, 190 (39%) for PDCA. Complication rate for was 32.7% (159/486); Clavien grade 1 = 16.4% (n = 26), grade 2 = 42.1% (n = 67), grade 3 = 18.2% (n = 29), grade 4 = 17% (n = 27). There were 8 peri-op deaths 1.6%. Overall pancreatic fistula rate was 17.5% (85/486); ISGPF Grade A = 23.5% (n = 20), Grade B = 42.4% (n = 36) and Grade C = 34.1% (n = 29). Median (95% CI) survival for PDCA = 25.5 mo (20.3–30.7). Survival analysis didn't reveal a significant relationship between occurrence of pancreatic leak on long-term survival ($p = 0.199$). However a serious complication (Clavien 4 and 5) resulted in significantly ($p = 0.03$) reduced long-term [(med (95% CI)] survival [14.7 (1.7–27.6)] compared to those without [24.31 (20.8–27.7].

Conclusion: The mortality and postoperative complication rates in this 7-year cohort of pancreatico-duodenectomy patients are comparable to those reported by other large centres. A serious complication is associated with a reduction in long-term survival for patients with pancreatic ductal adenocarcinoma but this is not specific to an anastomotic pancreatic leak.

FOS340

SPLANCHNIC VENOUS THROMBOSIS IN ACUTE PANCREATITIS: IS THERE A ROLE FOR ROUTINE SYSTEMIC ANTICOAGULATION IN SEVERE ACUTE PANCREATITIS?

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Introduction: Splanchnic Vein thrombosis involving the splenic vein and porto-mesenteric veins is a relatively

common observation in severe acute pancreatitis, associated with pancreatic necrosis and peri-pancreatic collections. The precise role of systemic anticoagulation to minimize the thrombosis and achieve recanalization is relatively unknown. We conducted a retrospective study to analyse natural history of splanchnic venous thrombosis in acute pancreatitis.

Methods: Complete data available for 87 patients with acute pancreatitis admitted or referred to a tertiary pancreatic unit was analysed for demographics, clinical data including severity and aetiology of pancreatitis. Imaging was reviewed to assess severity and extent of necrosis and collections, apart from establishing the presence /absence of splenic and/or porto-mesenteric thrombosis. Treatment data was looked at to assess anticoagulation and assess the effect of anticoagulation in achieving recanalization.

Results: There were 52 males and 35 females. Gall stones were the commonest etiology (43.68%) followed by alcohol (28.74%). 29.88% patients had severe acute pancreatitis based on scoring criteria. 25.28% had splanchnic venous thrombosis (SVT) observed on CT scanning. Of all patients with SVT, 54.54% patients had splenic vein thrombosis, while 22.72% patients had porto-mesenteric thrombosis. Anticoagulation was not done in 17/22 patients, while 5/22 patients with SVT were considered for anticoagulation. Anticoagulation was possible only in 2 patients while the remaining 3 patients were not anticoagulated due to contraindications. Of the group with did not receive anticoagulation (n = 17); 76.47% patients had chronic occlusion of the splenic and/or porto-mesenteric venous system with resultant collateralization/portal hypertension.

Conclusion: The risk of developing SVT in patient with severe acute pancreatitis is significant. Current protocols with respect to systemic anticoagulation (duration/methods) remain undefined. The effect of systemic anticoagulation in such high risk patients should be studied on a prospective basis and may be set the pathway for a randomised trial to assess the benefits/risks and long term outcomes following SVT in acute pancreatitis.

FOS341
CLINICAL, PATHOLOGIC, AND BIOLOGIC CHARACTERIZATION OF WHO GRADE 3, NON SMALL CELL AND NON LARGE CELL NEUROENDOCRINE CARCINOMA OF THE PANCREAS

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Introduction: WHO has classified pancreatic neuroendocrine tumors (PanNETs) into 3 grades based on Ki-67 and mitosis: grade 1 (Ki-67 2% and mitosis < 2/10 HPF), grade 2 (Ki-67 = 3–20% and/or mitosis = 2–20/10 HPF), and grade 3 (Ki-67 > 20% and/or mitosis > 20/10 HPF). Little is known about a small percentage of grade 3 PanNETs that have a morphology indistinct from grade 1–2 PanNETs, but with a Ki-67 > 20% and/or mitosis > 20/10 HPF. This study explores their clinical, pathologic and biological features.

Methods: Review of 94 patients who had PanNET and also underwent resection/biopsy from 2002 to 2011 identified 10 WHO grade 3 PanNETs that were neither small cell carcinoma nor large cell neuroendocrine tumor. These PanNETs had a morphology very similar to grade 1–2 PanNETs, however they had mitosis > 20/10 HPF (n = 5) and/or a Ki-67 > 20% (n = 10). Clinical history and pathologic features were reviewed. Formalin-fixed, paraffin embedded surgical specimens were obtained from these patients and were immunohistochemically labeled with Ki67, her2/neu, c-Met (hepatocyte growth factor receptor), and epidermal growth factor receptor (EGFR).

Results: Of the 10 cases, 60% were male and ages ranged from 38 to 78 years. The 3 youngest pts had a hereditary syndrome: 2 with MEN1 and 1 with Von Hippel–Lindau. Functional tumor was only seen in 1 pt with MEN1 syndrome. The 2 MEN1 pts had multiple PanNETs, all other cases had a single PanNET. Tumor size ranged from 2.4 to 26.0 cm. 5 pts presented with stage IV disease, 4 with stage II and 1 with stage I. Overall survival for these pts was significantly worse than that of grade 1 and 2 PanNET pts. Focal necrosis, lymphovascular invasion, and perineural invasion were observed in 50%, 70%, and 30% of cases, respectively. All cases were diffusely and strongly labeled with c-Met; 6 had weak Her2/neu membranous labeling and 4 had expression of EGFR.

Conclusion: Grade 3 PanNETs account for ~10% of PanNETs and can occur in pts with or without a hereditary syndrome. Most pts present with advanced disease and have worse prognosis. The tumors are always associated with high risk pathologic features (necrosis, lymphovascular and perineural invasion and thickened fibrotic septa) and express other growth factor receptors such as c-Met, Her2/neu or EGFR, which may provide a clue towards further understanding their biology to identify novel targeted therapies.

FOS342
THE ROLE OF CARCINOEMBRYONIC ANTIGEN-RELATED CELL ADHESION MOLECULE (CEACAM) 1, 5 AND 6 AS PROGNOSTIC FACTORS IN PANCREATIC ADENOCARCINOMA

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Introduction: Members of the carcinoembryonic antigen-related cell adhesion molecule (CEACAM) family have been implemented as tumor markers in the clinical routine workup (CEACAM 5 known as CEA). The aim of this study was to assess the role of carcinoembryonic antigen-related cell adhesion molecule (CEACAM) 1, 5 and 6 and their combination as prognosticators in pancreatic adenocarcinoma (PAC).

Methods: All patients with PAC underwent surgery between 1994 and 2008 at the University Medical-Center Hamburg-Eppendorf.

Expression of CEACAM1, 5 and 6 in specimens from 137 patients with PAC were assessed by immunohistochemistry (IHC) on a tissue micro array and matched with clinicopathological data. Furthermore, serum analysis of CEACAM 1, 5 and 6 were conducted by enzyme linked immunosorbent assays (ELISA) of 46 patients. Serum values of patients with PAC were compared to 43 patients with chronic pancreatitis (CP) and 40 serum probes of healthy blood donors (BD). Optimal cut-off values were calculated by receiver operating characteristic (ROC) and Youdens analysis.

Results: Immunohistochemical expression of CEACAM1 was found in 86 patients (62.7%), CEACAM5 in 87 (63.5%) and CEACAM6 in 99 patients (72.3%). Patients with CEACAM5 and 6 expression showed a significantly shortened overall-survival (OS) in the Kaplan-Meier survival analysis (CEACAM5 22.0 months (4.1–47.9 months) vs. 16.0 months (12.8–19.2 months), log-rank test $P = 0.025$; CEACAM6 22.0 months (5.6–38.4 months) vs. 14.0 months (7.9–20.0 months), $P = 0.010$). Serum values for CEACAM1 and 5 were significantly increased compared to BD ($P < 0.001$), whereas CEACAM6 serum values in PAC were higher than in CP and BD ($P = 0.006$ and $P = 0.029$). Survival analysis revealed a prolonged OS for patients with low serum CEACAM1 values (18.3 vs. 11.8 months, $P = 0.02$).

Conclusion: CEACAM5 (CEA) has become a widely accepted tumor marker in PAC, though its prognostic impact with respect to long-term survival lacks of precision. We were able to show, that the analysis of several CEACAM types can be helpful to stratify patients into different risk groups. We therefore conclude that not only CEA influences tumor progression but also CECAM1 and 6 are important factors in local and distant tumor growth.

FOS343
IS SPLEEN PRESERVING DISTAL PANCREATECTOMY ONCOLOGICALLY SAFE?

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Introduction: Spleen preserving distal pancreatectomy has been shown to be safe and effective in treating benign and low-grade malignant lesions of the pancreas. Preserving the spleen would preserve one's immune function and avoid receiving regularly scheduled vaccinations and liberal use of antibiotics. However, despite standard practicing patterns, little data exists to evaluate the oncologic impact of splenic preservation during resection of distal pancreatic malignancies.

Methods: We retrospectively reviewed 82 consecutive distal pancreatectomies performed for suspected or known pancreatic malignancies from June 1, 2005 to July 1, 2011 by a single surgeon. Exclusion criteria included metastatic disease or planned en-bloc resection, leaving 46 cases for analysis. Data was reviewed for spleen or splenic vessel involvement according to the final pathology report, relationship of the tumor to the splenic vessels and correlation with preoperative findings based on computed tomography (CT) or other imaging.

Results: Of the 46 cases of distal pancreatectomy for suspected cancer, the final pathology showed adenocarcinoma or neuroendocrine tumor in 22 (48%), mucinous cysic neoplasm in 12 (26%) and benign in 12 (26%). In the 22 patients with malignant etiology, 2 had invasion of the spleen or splenic vessels on final pathology. Both cases were consistent with adenocarcinoma. The first involved the splenic flexure, necessitating en-bloc colon resection. The second had splenic artery involvement as identified by CT, but no malignancy in the spleen itself. No positive splenic nodes were identified. There were no infectious complications. Preoperative CT revealed 5 cases (10.9%) of splenic vessel encasement, 1 of which was malignant on final pathology.

Conclusion: Splenic involvement in distal pancreatic tumors is rare. Our data demonstrate that splenectomy is not mandated for distal pancreatic tumors. The spleen could be preserved in a majority of cases. CT imaging conferred a high negative predictive value, suggesting accuracy when no vessel involvement was demonstrated. The combination of pre and intra-operative factors can adequately identify the necessity of splenectomy, allowing the approach to be tailored as appropriate to individual patients.

FOS344
A NEW TRANSITORY MESENTERICO-PORTAL SHUNT FOR PANCREATIC RESECTION IN CASE OF CHALLENGING VENOUS RESECTION

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Introduction: To report a new type of transitory mesenterico-portal shunt (TMPS) which can be used during pancreaticoduodenectomy (PD) for adenocarcinoma of the pancreas in case of extensive portal vein (PV) or superior mesenteric vein (SMV) invasion with collateral circulation.

Methods: The resection was performed using a new TMPS. A TMPS is than performed by using a prosthesis of Gore-Tex® (FEP*Ringed Gore-Tex®) of 20 cm of long (diameter 14–20 mm, according to the diameter of the SMV axis) which is inserted between the distal stump of the PV and the proximal stump of the SMV by two termino-terminal anastomosis with 5/0 non-absorbable monofilament running sutures. The pancreaticoduodenectomy with lymphadenectomy is completed and the specimen is removed en-bloc with the involved tract of the PV/SMV. Finally, the TMPS of Gore-Tex® is removed and a direct termino-terminal anastomosis between the PV and SMV is performed with 6/0 non-absorbable monofilament running sutures. Fourteen patients with borderline or locally advanced "unresectable" adenocarcinoma of the pancreas underwent PD or total PD with venous resection after neoadjuvant chemotherapy.

Results: The postoperative mortality was nil, while the postoperative morbidity was 33%. In all patients the TMPS allowed to achieve curative intent resection avoiding massive bleeding or venous liver ischemia. Overall one-year survival was 97%, while one year disease-free survival was 36%.

Conclusion: The present new TMPS is feasible and safe and should be considered as an effective technical option for

patients with adenocarcinoma of the pancreas with extensive venous involvement and the concomitant presence of a collateral circulation requiring PD.

FOS345
PANCREATIC CANCER CELLS SECRETE CXCL12 WHICH IS CHEMOATTRACTIVE UPON PERIPHERAL NEURAL GLIA: REVERSAL OF A PARADIGM

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Introduction: Neural invasion (NI) in pancreatic cancer (PCa) results from the biological affinity of PCa cells (PCCs) to intrapancreatic nerves. However, the molecular mediators of NI, and particularly the role of chemokines in this chemoattraction between nerves and PCCs, remain largely unknown. In this study, we sought to determine the role of the chemokine CXCL12 and its rececptor CXCR4 in NI in PCa.

Methods: Expression of CXCL12 and CXCR4 was studied in normal human pancreas (NP), PCa tissues, PCC lines, intrapancreatic nerves and human Schwann cells (hSC) via immunohistochemistry, immunoblotting and enzyme-linked-immunosorbent-assay (ELISA). To identify the contribution of CXCL12/CXCR4 axis to NI, 3D-neural-migration and chemotaxis assays were performed under the influence of the CXCR4 chemical inhibitor AMD3100 and recombinant CXCL12.

Results: PCa tissues and PCCs demonstrated an upregulation of CXCR4 and especially of CXCL12 when compared to NP. Interestingly, intrapancreatic nerves and within these especially hSC showed prominent levels of CXCR4. When co-cultivated, hSC migrated in a strictly targeted manner towards PCCs long before these even started with their migratory activity. Pre-treatment of hSC with AMD3100 significantly reduced the cancer-targeted migration of hSC. Correspondingly, recombinant CXCL12 exerted a potent chemotactic effect upon hSC.

Conclusion: Chemokines like CXCL12 which are secreted by PCCs strongly attract glia cells that harbor the corresponding chemokine receptors like CXCR4. Hence, in sharp contrast with the traditional assumption, NI results from the migration of peripheral glia (hSC) towards PCCs. This "chemokine-mediated migration of nerves towards cancer" urges for a reversal in our common understanding of NI in PCa.

FOS346
CONTEMPORARY OUTCOMES FROM SYNCHRONOUS PORTAL/SUPERIOR MESENTERIC VEIN (PV/SMV) RESECTION AT PANCREATICODUODENECTOMY FOR CANCER

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Introduction: Pancreaticoduodenectomy (PD) is the standard of care for localised cancer of the pancreas. Resectability can be improved by synchronous resection of the portal/SM vein. The procedure may add morbidity without benefit. We previously reported outcome in PV/SMV resection from 1966–2005 but included patients having arterial and venous resection and predated the era of high-volume centres. This study examines outcome from PV/SMV resection at PD in the 21st century.

Methods: Medline and Embase searches identified 44 manuscripts giving data on 1905 patients undergoing PV/SMV resection reported during 2000–2010. Data were only included from original reports providing resection details and outcome data. Data were extracted to Cochrane criteria to populate a pre-determined database. Reporter variables included numbers of vein resections (total and proportion of all PD), outcome and survival. Data are presented as medians (range) of pooled data.

Results: Forty four centres report outcome after PD with vein resection to 2010. Of 1905 vein resections, 1638 were in centres which provided denominator data on PD without vein resection. PD with vein resection comprised 24% of 6, 923 PD. Two centres used artificial grafts; all others used either partial circumference resections or autologous vein reconstruction. Median 30-day mortality ranged from 0–11%. The modal 30-day mortality was 0%. Median survival was 15 (9–33) months.

Conclusion: This is thought to be the largest pooled report of portal/SMV resection at PD. The data show that vein resection is undertaken in up to a quarter undergoing PD with acceptable operative mortality. Median survival is 15 months. Vein resection has become an established option in the modern operation of pancreaticoduodenectomy.

FOS347
METASTATIC PANCREATIC NEUROENDOCRINE TUMOURS: DOES AGGRESSIVE SURGICAL INTERVENTION IMPROVE OUTCOME?

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Introduction: Pancreatic neuroendocrine tumours (PNETS) often present late. At diagnosis 65% of patients have metastases, with median survival of 24 months. The conventional approach is conservative management. Recent evidence has suggested that aggressive treatment leads to better outcomes. We have shown that in a cohort of patients with advanced PNETs aggressive resection prolongs survival.

Methods: All patients with intra-abdominal neuroendocrine tumours (NETs) were assessed by the Hepato-pancreato-biliary and NET Multidisciplinary Teams from January 2002 to November 2011 were prospectively registered on a database. All patients with PNETs were identified. Demographic, treatment, peri-operative morbidity and survival data were graded using the Clavien system and analysed using SPSS.

Results: 239 patients were assessed. 61 patients had PNETs (36 F : 25 M) with median age of 65. 55 patients underwent 71 resections. 52 had primary tumours resected and 3 patients had the primary tumour left in situ. Resections included: 29 conventional pancreatic; 17 extended (including vascular or multi-visceral resections); 9 pancreatic and liver resections (4 synchronous, 5 sequential); 16 had liver resections alone. 27 patients had 48 additional medical and radiological interventions.

Peri-operative mortality 0%. 42% morbidity. 3 operated patients died from progressive disease. 2 non-surgical patients died. Overall survival for PNETs was 56/61 (92%) at a median follow up of 28 months. Survival for operated patients was 52/55 (95%) at 33 months.

Conclusion: An aggressive multi-modal approach with resection of advanced PNETs leads to excellent long term survival with acceptable patient morbidity.

FOS348
NEW PATHWAYS OF ENHANCED RECOVERY AFTER SURGERY IN PANCREATIC SURGERY: PRELIMINARY RESULTS FOR SAFETY AND ADHERENCE

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Introduction: Enhanced recovery after surgery (ERAS) programmes have been increasingly applied in different surgical specialties improving postoperative recovery and reducing morbidity. Its role on upper gastrointestinal major surgery, especially pancreatic surgery, is still controversial and data on its application are few. The objective of this study was to test safety and feasibility of an ERAS pathway for patients undergoing pancreaticoduodenectomy (PD) and left pancreasectomy (LP).

Methods: From October 2010 to November 2011, 103 consecutive patients undergoing PD (n = 60) and LP (n = 43, laparoscopic 53.4%) were treated with a multimodal, interdisciplinary perioperative ERAS pathway. The items implemented were: preadmission counselling, no preoperative bowel preparation, carbohydrate loading, epidural analgesia avoiding the use of opioids, intraoperative iv fluid restriction (4–5 ml/kg/hr), postoperative nausea and vomiting and hypothermia prophylaxis, removal NG tube at the end of surgery, POD 1 mobilization for at least 4 hrs, solid food diet on POD 1, early stop of iv infusions and removal of urinary catheter. Complications were classified according to Clavien-Dindo classification (major complications grade III-V).

Results: Adherence to the pathway: Preadmission counselling 72%. Epidural analgesia 95% for PD and 83% for LP. 64% of PD pts were successfully mobilized on POD1 for a median of 60 minutes, 95% on POD 2. Median day of solid diet intake was day 3[1] and iv infusions were stopped on day 5[2]; only 8% of pts needed the repositioning of a NGT. 73% of LP pts were mobilized on POD1 with a median of 53 minutes and 93% on POD 2. The median day of solid diet intake was day 2[1] and iv infusions were suspended on day 4[1]. Surgical outcome: major complications 17% in PD and 3% in LP, and mortality 4% and 0%. Delayed gastric emptying occurred in 10% of PD pts. Readmission rate was 9% (PD) and 10% (LP). Postoperative LOS was 9.5[3] days for PD and 7[2] days for LP.

Conclusion: The application of an ERAS protocol proved to be safe with no increase in morbidity and readmission rate. Adherence to most items, especially preoperative and intraoperative was high. Compliance with postoperative items such as early stop of iv infusions and early solid food diet had suboptimal results. Data on length of stay for both procedures are encouraging.

FOS349
RADIOLOGICAL INTERVENTION IN MANAGEMENT OF COMPLICATIONS AFTER PANCREATICODUODENECTOMY

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Introduction: Pancreaticoduodenectomy is still associated with a high morbidity rate but mortality, overall relaparotomy rate and length of hospital stay have decreased substantially. This might partly be due to improved non-surgical and radiological management of postoperative complications in particular in high-volume centres. The aim of the present study was to analyze the role of radiological intervention in management of postoperative complications in patients after pancreaticoduodenectomy.

Methods: This study included 909 consecutive patients who underwent pancreaticoduodenectomy between 1992 and 2010. Patients were divided into 2 groups, patients treated from 1992–2002, group 1 and patients treated from 2003–2010, group 2. Group 1 contained 454 patients, group 2 contained 455 patients. These 2 cohorts were compared to analyze any changes in surgical outcomes and postoperative management over time. Data were obtained from a prospectively collected database.

Results: In 464 patients (51%) 1 or more surgical complications were reported. Complications were treated conservatively in 256 patients, required 1 or more radiological interventions in 157 patients and required a surgical intervention in 86 patients. The amount of patients treated with radiological interventions increased (group 1: 11%, group 2: 23%, $P < 0.001$). The total number of performed relaparotomies decreased (group 1: 92, group 2: 46, $P = 0.03$). Length of hospital stay shortened over the last decade (group 1: 15, group 2: 12 days, $P < 0.001$) and was shorter in patients who underwent radiological interventions compared with surgical interventions, 25 vs. 37 days resp. ($P < 0.001$). Overall mortality was 2.3% and did not differ between groups.

Conclusion: There has been an increase in the use of radiological interventions for surgical complications in patients after pancreaticoduodenectomy during the past decade.

Radiological interventions in patients with postoperative complications might lead to a shorter hospital stay compared to patients treated with surgical interventions.

FOS350
ROLE OF KRAS PATHWAY IN PROGRESSION OF PANCREATIC CANCER

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Introduction: Pancreatic carcinoma (CaP) is an aggressive disease with extremely low sensitivity to anticancer agents. KRAS wildtype patients could potentially benefit from anti-EGFR therapy. In 90% of patients, with KRAS mutated, further targets downstream KRAS and along interacting signaling pathways have to be identified. The aim of this study was to analyze transcript levels of ten important genes along the KRAS signaling pathway in patients with CaP and evaluate their importance for disease progression.

Methods: Transcript levels of SOS1, GRB2, SHC1, KRAS, RAF1, RAC1, MAP2K1, MAP2K2, MAPK1, and MAPK3 in tumors and adjacent non-neoplastic control tissues from 21 patients with CaP were determined by real-time PCR with relative quantification. POP4 and ELF1 were used for normalization of the results as reference genes. Differences in transcript levels in patients divided by TNM stage and grade were then analyzed by non-parametric tests (Kruskal-Wallis and Spearman tests, $p < 0.05$ considered as significant).

Results: Levels of SHC1 ($p = 0.025$), KRAS ($p = 0.032$), RAC1 ($p = 0.001$), and MAPK3 ($p < 0.001$) were upregulated whilst those of RAF1 ($p < 0.001$), MAP2K2 ($p = 0.007$), and MAPK1 ($p = 0.001$) were downregulated in tumors compared to control tissues. MAPK1 level significantly correlated with SOS1, GRB2, KRAS ($p = 0.027$) and MAP2K1 levels in tumors. Similarly, GRB2 level significantly correlated with levels of KRAS, MAPK1, MAP2K1, and MAP2K2 in tumors. Except MAPK1 with KRAS ($p = 0.016$), these correlations were not observed in control tissues. Levels of the followed genes did not significantly associate with TNM stage or grade of carcinomas except the level of MAPK1 which was significantly higher in grade 3 in comparison to grade 2 tumors ($n = 10$ vs. $n = 11$, $p = 0.019$).

Conclusion: Detailed analysis of correlations between levels of the analyzed genes in control and tumor tissues revealed massive deregulation of KRAS pathway in tumors. This study identified several potential candidates for drug targets along the KRAS signaling pathway deregulated during pancreatic carcinogenesis. Namely MAPK1 (ERK2) whose level significantly associated with the aggressiveness of pancreatic cancer shall be further explored. Study was supported by GACR No. P301/12/1734 and IKEM G9012 grants.

FOS351
LAPAROSCOPIC DISTAL PANCREATECTOMY: RANDOMIZED COMPARATIVE PRE-CLINICAL STUDY TO ASSESS EFFICACY OF A RF-ASSISTED TRANSECTION DEVICE

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Introduction: Several techniques have been described for pancreatic transection in laparoscopic distal pancreatectomy (LDP) and the best one remains to be elucidated. The incidence of pancreatic fistula (PF) after resection of distal pancreas persists high in most series. LDP is today the gold standard procedure for resection of benign and some malignant neoplasms of left pancreas. Our goal was to compare safety and performance of a RF-assisted transection device versus stapler device in a porcine model of LDP.

Methods: LDP was performed in 29 swines. Pancreatic resection was performed by RF-assisted device (Coolinside®, Apeiron Medical, Valencia, Spain) in 15 swines (RF group), and by mechanical stapler in 14 swines (ST group). Animals were randomly assigned preoperatively either to RF or ST group, followed daily and necropsied at 4 weeks PO. Primary endpoints were the development of PF using the Pancreatic Anastomotic Leak Study Group definition (biochemical PF) and/or the presence of amylase-rich fluid collections/abscesses during necropsy and/or dye extravasation from the remnant duct. Secondary endpoints were postoperative plasmatic amylase (PA) and glucose concentration (PG), intra/post-operative complications/death, surgery and transection time.

Results: 1 biochemical PF without clinical consequences in RF and 2 clinical PF in ST group were diagnosed. Median peritoneal liquid amylase at 4PO day was 2330 UI/L in RF and 1328 in ST group ($P > 0.05$). No differences were found comparing postoperative PA/PG nor comparing median surgery/transection time (95/4 min in RF and 78/4 in ST). All RF animals showed at least a 10% increase of their initial weight at 4 weeks PO while two ST animals did not.

There was one postoperative wound infection in RF, two food intolerances and two surgery unrelated deaths in ST group. Transection surfaces showed a central area of necrosis surrounded by intense fibrosis and ductal obliteration in RF, and less fibrosis with increased limphocitic infiltration in ST animals.

Conclusion: The RF-assisted device may be at least as safe and efficacious as staplers to perform LDP in terms of PF prevention, surgical and transection time, postoperative complications rate and postoperative pancreatic function. The results from this study are the first step towards further clinical trials using the Coolinside device.

FOS352
SECOND SURGERY AFTER RESECTION FOR PANCREATIC CANCER

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Introduction: The majority of the patients previously resected for pancreatic cancer develop tumor's recurrence within 2 years of surgery, and recurrent cancer remains a significant therapeutic challenge. Only few series have previously documented a second surgery after pancreatic resection in patients with pancreatic adenocarcinoma. The purpose of this study was to evaluate the effect of surgery in patients with recurrent pancreatic or second tumor after resection of primary cancer.

Methods: From January 1997 to December 2009, 226 patients who underwent resection for pancreatic cancer were prospectively investigated with intensive follow-up including tumor markers (CEA and CA 19-9), abdominal ultrasound and/or helical computer tomography, chest x-ray every 3 months for the first 2 years, and then every 6 months. Whole body PET scan (with CT acquisition) was performed within one year. Median follow-up time was 24 months (range 17–108 months).

Results: A total of 37 patients underwent reoperation: indication for surgery was recurrence of pancreatic cancer in 31, and a possible second cancer in 6 patients. Among 31 patients with recurrent pancreatic adenocarcinoma, 13 had radical resection, 7 had palliative resection, 11 had digestive and/or biliary bypass. There was no operative mortality. Median survival time after radical resection was 17.5 months, and 6 months after palliative resection or bypass. Six patients had a second cancer detected by PET scan, and successfully resected: 4 colon cancer, 1 lung cancer, and 1 cancer for the larynx. Five patients are alive and disease-free, one patient died 15 months after reoperation for recurrence of pancreatic cancer.

Conclusion: Although rarely feasible, curative resection of recurrent tumor can be carried out safely in selected patients who had undergone pancreatectomy for pancreatic carcinoma. Prolonged survival is possible in this subset of patients. Intensive and accurate follow-up is warranted for these patients in order to improve the management of recurrent disease. Surgery has to be considered in the multimodality treatment of relapsed pancreatic cancer.

FOS353
PERI-OPERATIVE OUTCOMES OF 500 PANCREATODUODENECTOMIES AT TATA MEMORIAL CENTRE: TRENDS AND LESSONS LEARNT OVER 2 DECADES

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Introduction: The technique of pancreatoduodenectomy (PD) has steadily evolved over the last few decades. Evidence from literature suggests that technical refinements, amongst other reasons, have helped improve peri-operative outcomes. Our aim was to analyze specific changes in technical aspects of PD over 2 decades at our centre and determine their effects on peri-operative outcomes.

Methods: The period from 1992 to date was divided into three specific time periods marking major shifts in practice and performance of PD, viz. period A – 1992 till 2001 (when pancreaticogastrostomy was predominantly performed), period B – 2003 – June 2009 (standardization of pancreaticojejunal anastomosis), and period C – July 2009 to date (introduction of neoadjuvant chemo-radiotherapy, vascular resections, and increasing surgical volume). Peri-operative outcomes in these three periods were compared.

Results: 500 PDs were performed in the study period. Morbidity and mortality rates were 34% and 5.4%, respectively. Incidence of pancreatic anastomotic leaks (POPF), hemorrhage, delayed gastric emptying (DGE), and bile leaks were 10.8%, 6%, 3.9%, and 3.4%, respectively. On further comparison of the periods, POPF (16% vs 7% vs 10.7%) and DGE (6.9% vs 2.4% vs 2%) rates significantly improved from period A to B ($p < 0.02$ and $p < 0.01$), with no differences between periods B and C. Hemorrhage (11.1% vs 5% vs 2%) and bile leak rates (6.3% vs 3.4% vs 0.7%) significantly improved in period C as compared to A ($p < 0.002$ and $p < 0.01$), although these were not different from period B. In period C, 17 patients underwent PD using the superior mesenteric artery-first technique and 8 patients required vascular resections in periods B and C.

Conclusion: Standardization of PD and the anastomotic technique not only improved peri-operative outcomes, but additionally helped sustain these improvements despite increasing surgical volume as well as the complexity of resections.

FOS354
QUALITY OF SURGERY IS A MAJOR PROGNOSTIC FACTOR IN PANCREATIC CANCER

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Introduction: Recommendations for surgery of pancreatic head cancer are based on the resection of the retroportal pancreatic lamina into the sheath of the superior mesenteric artery in order to achieve a regional lymphadenectomy (RL) and increase R0 resection. The influence of surgical technical update (RL) on prognosis has not been studied to date.

Methods: Retrospective single-center study, including 119 patients operated between 1992 and 2008: 71 patients underwent standard pancreaticoduodenectomy (PD group) and 48 patients had a complete cleaning of the retroportal lamina (PD + RL group). Morbidity, mortality and long term survival were compared.

Results: The 2 populations were comparable. Despite a high overall morbidity (52%), there was no mortality. There was no difference in morbidity between the two groups. In the PD + RL group, average hospital stay was reduced (19 vs 15 days, $p = 0.02$) and more lymph nodes were resected (14 vs 20, $p < 0.001$). There wasn't any change neither in the rate

of R0 resection (61% vs 70%, p = 0.2) nor in involved lymph nodes rate (71 vs 72%, p = 0.5). The rate of patients treated by adjuvant therapy increased (49 vs 79%, p = 0.001) and median survival was improved in PD + LR group (15 [CI95% 12–19] vs 32 months [CI95% 19–45], p = 0.02). In multivariate analysis, R0 resection (p = 0.01), adjuvant therapy (p = 0.02) and regional lymphadenectomy (p = 0.02) were independent prognostic factors of survival.

Conclusion: Regional lymphadenectomy ie resection of the retroportal pancreatic lamina into the sheath of the superior mesenteric artery, without increasing morbidity, is an independent prognostic factor in cases of pancreatic head cancer.

FOS355
ACUTE PANCREATITIS CONDITIONED MESENTERIC LYMPH CAN CAUSE CARDIAC DYSFUNCTION

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Introduction: Critical illness (CI) including acute pancreatitis (AP) is associated with multiple organ dysfunction syndrome (MODS) and death. Most common in MODS are cardiac and pulmonary dysfunction. The 'gut-lymph hypothesis' states that MODS is due to the release of toxic factors from the intestine into mesenteric lymph (ML). Significant composition changes to ML are associated with acute pancreatitis and other CI's. ML is delivered to the systemic circulation via the thoracic duct and en route bypasses the liver avoiding potential detoxification, before first encountering the heart and then lungs. The aim of this study was to determine the effect of AP conditioned ML on cardiac function and the effect of external drainage of ML.

Methods: Groups (n = 8/group) of normal rats and those with taurocholate induced severe AP, a model of critical illness, had either no lymphatic intervention or thoracic duct (TD) ligation with external ML drainage (to protect the hearts from exposure to ML). After 6 hours the heart was removed from both groups for ex vivo functional measurements, including cardiac output and ventricular contractility (+dP/dt), relaxation (–dP/dt). In a separate experiment ML was collected from normal rats and those with established taurocholate AP and infused into ex vivo perfused working hearts from donor normal rats to assess the impact on cardiac function.

Results: Significant cardiac dysfunction was found in the hearts removed from rats with established AP alone (no lymphatic intervention) compared to the control group ($p < 0.05$). Strikingly this dysfunction did not occur in rats with established AP and TD ligation with ML drainage. In the second experiment infusion of AP conditioned ML resulted in an immediate, similar and significant reduction of cardiac output ($p < 0.05$) with corresponding significant reductions in the measures of cardiac contractility and relaxation ($p < 0.05$) compared with normal lymph. There was no change in the heart rate during these experiments, indicating that this was an inotropic and not a chronotropic effect.

Conclusion: AP conditioned ML causes significant cardiac dysfunction which can be prevented by TD ligation and external ML drainage. This cardiodepressant effect is likely to be important in other CI's. Further research is required to study the impact of conditioned ML in AP and other CI's on the function of other vital organs in MODS.

FOS356
SURGICAL TREATMENT OF INSULINOMAS. A SINGLE-INSTITUTION EXPERIENCE OF 50 PATIENTS

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Introduction: Insulinomas are rare pancreatic endocrine tumors. The aim of the study was to assess the results of the radiological and surgical procedures that had been employed in operated patients with insulinoma and to determine prognostic factors regarding the recurrence risk.

Methods: This is a retrospective monocentric study on 50 patients (mean age: 51 years) who underwent surgery for insulinoma between 1988 and 2010. Clinical, radiological, perioperative data and pathological findings were analysed along with short- and long-term follow-up after surgical treatment. Kaplan Meier analysis was employed to study recurrence-free survival. Uni- and multi-variable analyses were performed to determine prognostic factors related to recurrence risk.

Results: Echoendoscopy and MRI-scan had a sensitivity of 90% and 85%, respectively. In 3 patients (6%) per-operative examination failed to localize a tumor (nesioblastosis = 2, insulinoma = 1). During a median follow-up of 52 months, 9 patients experienced a recurrence. In patients with insulinoma totally removed by surgery, the recurrence-free survival rate was 72% after 5 years. A uni-variable analysis revealed that the following factors were predictive of recurrence: pathological diagnosis of carcinoma ($p < 0.001$), lymph node invasion ($p < 0.001$), expression of Ki67 > 1% ($p = 0.003$), and presence of MEN1 mutation. Only endocrine carcinoma and MEN1 disease were identified as significant independent factors of recurrence.

Conclusion: In this series of operated patients with insulinoma, the high recurrence rate (28% after 5 years) is mainly related to endocrine carcinomas. This underlines the importance of histopathological criteria for the prognostic evaluation, and of the long-term follow-up after surgical resection, even when the pancreatic endocrine tumor is diagnosed as benign.

FOS357

ANTECOLIC VERSUS RETROCOLIC ROUTE OF THE GASTROENTERIC ANASTOMOSIS AFTER PANCREATODUODENECTOMY – ARCO-TRIAL

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Introduction: Delayed gastric emptying (DGE) is one of the most prevalent complications after pancreatoduodenectomy (PD). Some studies suggest that an antecolic route of the gastroenteric (GE) reconstruction leads to a lower incidence of DGE, compared to a retrocolic route. In a consecutive series from our hospital, we found no difference in DGE after antecolic or retrocolic GE reconstruction. The aim of the present trial was to investigate the relationship of the route of GE reconstruction after PD and DGE.

Methods: Ten middle to large volume centers contributed to the patient inclusion for this multicenter RCT. Patients who were older than 18 years, gave informed consent and underwent PD were included. Standard operation was a pylorus-preserving PD, while a 'classic' PD was reserved for cases of tumor ingrowth in the distal stomach, pylorus or proximal duodenum. Total pancreatectomies were excluded. Patients were randomized intraoperatively, when resection was achievable. Primary endpoint was DGE according to the ISGPS grading system described by Wente et al. in Surgery, 2007. Secondary endpoints included other complications and length of hospital stay.

Results: There were 125 patients in the retrocolic (R-) group, and 121 patients in the antecolic (A-)group. Baseline and treatment characteristics were similar. In the R-group, 75 patients (60%) developed DGE of any grade, versus 73 (60%) in the A-group (P-value 0.93). Clinically relevant DGE (grade B or C) was present in 44 (35%) and 41 (34%) patients, respectively. 'Primary' DGE (occurring in the absence of other intra-abdominal complications) occurred in 38 (31%) and 30 (25%) patients, respectively (P 0.66). There were no differences other (non-)surgical complications, the need for (par)enteral nutritional support, and hospital mortality. Median length of stay was 12 days in both groups (P 0.24).

Conclusion: In PD, the route of GE reconstruction has no influence on postoperative incidence of DGE or other complications. The etiology of DGE needs further investigation. The GE reconstruction in PD should be routed according to the surgeon's preference.

FOS358

PANCREAS TEXTURE AND POSTOPERATIVE AMYLASE VALUE IN THE DRAINAGE FLUID AS BETTER PREDICTIVE FACTORS FOR POPF AFTER PD

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Introduction: Pancreaticoduodenectomy (PD) still has some controversies. The major complication is postoperative pancreatic fistula (POPF) and following sepsis or homorrhage is the main cause of mortality. Although drain is usually placed to remove amylase-rich fluid, it is also important to pull it out as soon as possible to avoid infection and POPF. In this study, we reevaluated intraoperative findings and analyzed amylase value in drains to determine the best timing of drain removal without causing POPF.

Methods: Patients who underwent PD from Jan 2003 to Oct 2011 in our ward were analyzed. After PD, we usually perform panceaticojejunostomy (PJ) using an end-to-side two layer anastomosis technique including duct-to-mucosa and pancreatic parenchyma-to-jejunal seromuscular layer with externally stenting. To prevent abdominal abscess and vascular hemorrhage, omental flap was put under PJ and fibrin glue sealants were used around anastomosis. Low pressure drainage was started soon after the operation at the upper portion of the PJ and was continued until removal. Amylase in the fluid on POD1, 3, or 5 was evaluated to determine the best timing of the drain removal. Among 240 patients, PJ cases were 235 (97.9%) including 1 death (0.4%) within 30-days.

Results: Patients were divided into two groups: #1/POPF(–) including non-fistula (67.7%) & grade A (8.9%), and #2/POPF(+) including grade B (20.4%) & grade C (3.0%), according to ISGPF definition. We first reevaluated pancreas texture and the diameter of main pancreatic duct (MPD), empirically used predictors for POPF. The texture was quite predictive, because more than half (58.1%) of "soft" fell into #2 whereas only 7.6% of "hard" was found in #2. In contrast, MPD was less informative. We then analyzed relation between POPF and amylase in the drain by ROC curve. AUC for POD3 (0.86) or POD5 (0.86) was larger than that for POD1 (0.81). Cut off point of amylase on POD5 was 100 U/L and that on POD1 was 2000 U/L, whereas that on POD3 was hard to be determined.

Conclusion: We therefore conclude that pancreas texture and amylase value in drains after PD is quite predictive of POPF. Hard texture highly predicts postoperative course without POPF. Drainage tube can be most safely removed when the value of amylase in the drainage is within 100 U/L at POD 5.

FOS359

A PHASE II STUDY OF ORAL S-1 WITH CONCURRENT RADIOTHERAPY FOR LOCALLY ADVANCED PANCREATIC CANCER

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Introduction: S-1 is a new oral fluoropyrimidine anticancer agent shown to be effective for pancreatic cancer. In a previous phase I trial, we evaluated the safety of S-1 combined with radiotherapy to determine the MTD and DLT in patients with unresectable pancreatic cancer. This phase II study was conducted to further evaluate the efficacy and toxicity of radiotherapy combined with S-1.

Methods: Eligible patients had locally advanced and unresectable pancreatic cancer without distant metastases, an ECOG performance status of 0-1, adequate organ and marrow functions, and no prior anticancer therapy. Patients initially received 4 weeks of chemoradiotherapy. S-1 was given orally at a dose of 80 mg/m^2/day twice daily on days 1 to 21. Radiotherapy was delivered in fractions of 1.25 Gy twice daily, 5 days per week for 4 weeks (total dose: 50 Gy in 40 fractions). One month after the completion of chemoradiotherapy, S-1 was administered for 14 days followed by a 14-day rest period. This cycle was repeated as maintenance therapy until disease progression or unacceptable toxicity.

Results: Fifty patients were enrolled in this phase II study. Forty-three patients (86%) completed the scheduled course of chemoradiotherapy. There was no treatment-related death or grade 4 toxicity. The major toxic effects were leukopenia and nausea. The objective tumor responses by RECIST criteria included 15 PR (30%), 23 SD (46%) and 12 PD (24%). Median PFS and median OS were 6.7 months and 14.3 months, respectively. Survival rates at 1 and 2 years were 62% and 27%, respectively.

Conclusion: Combination therapy with S-1 and radiation in patients with locally advanced and unresectable pancreatic cancer is considered a promising, well-tolerated regimen that can be recommended as an effective treatment for locally advanced pancreatic cancer.

FOS360

ADOPTING THE LEEDS PATHOLOGY PROTOCOL IN PANCREATICODUODENECTOMY – AN INDIAN EXPERIENCE

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Introduction: R0 surgery in pancreatoduodenectomy offers the only opportunity for cure. However it is seen that recurrence rates after R0 and R1 are fairly similar, suggesting that positive margins are often under reported. While transection margins are routinely examined, it is the circumferential margin that defines the difference between R0 and R1 surgeries. This study assesses the impact of the Leeds protocol, on the R status in pancreatoduodenectomies done at our centre.

Methods: 40 consecutive cases of pancreatoduodenectomies were analyzed, before and after adopting the Leeds's Protocol. Only cases of ampullary and Pancreatic head adenocarcinomas were included in the study. The circumferential margins were marked with differently colored inks, with special stress on the medial margin, ie SMV groove, and SMA surface. Serial axial slicing of the pancreatic head was done, with documentation of tumor distances from posterior, medial, and anterior surfaces. The differences in margin positivity before and after adopting the protocol were analyzed.

Results: On adopting the Leeds protocol, it is seen, that the incidence of Positive margins is more, the numbers with multiple positive margins also increased, and the medial margin positivity showed a marked increase. Small ampullary tumors, hitherto thought to be completely resected, often showed retro duodenal margin positivity.

Conclusion: Lack of standardized protocols for margin examination, has led to imprecise reporting of margin status, and inconsistency in the rate of margin positivity. Accurate circumferential margin examination, reveals the true R0/R1 status. This would result in better prognostication, and more reliable comparison of data. Coloring of margins, helps 3 dimensional analysis and interpretation of the anatomic relation around the pancreatic head. It offers a better feedback to both surgeon and radiologist.

FOS361

TOTAL LAPAROSCOPIC PANCREATICODUODENECTOMY FOR PATIENTS WITH TUMOR OF THE HEAD OF THE PANCREAS AND PERIAMPULLARE AREA

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Introduction: Aim to show our experience in treatment of 33 patients with tumor of the head of the pancreas and periampullare area by using a total laparoscopic approach.

Methods: From January 2006 to June 2011 33 patients from 39 underwent laparoscopic pancreaticoduodenectomy (LPDR) in our clinic. There were 20 females and 13 males, average age was 60.6 (range, 45–76) years. In retrospective study we analyzed the main outcome measures: conversion rate, blood loss, operative time, length of hospital stay, postoperative morbidity and mortality.

Results: Conversions were needed in 6 cases. The average blood loss was 606 ml (range, 100–2100) and 250 ml in the 5 last cases. The median operative time was 520 min, in the 5 last cases – 360 min. The pathogistology diagnosis were: pancreatic adenocarcinoma (n-18), ampulloma (n-9), chronic pancreatatis (n-1), low bile duct carcinoma (n-3), synchronous neuroendocrine tumor of the duodenum and multiple gastrointestinal stromal tumor (n-1), duodenal adenocarcinoma (n-1). The complication rate was 19 (57.5%). This included delayed gastric empting (n-3), pancreatic fistula (n-5), bile leak (n-1), bowel obstruction (n-1), bleeding (n-1), intraabdominal fluid collection (n-3). There were two cases (6%) of postoperative mortality.

Conclusion: Laparoscopic resection for treating of the patients with cancer of biliopancreatoduodenal area is a

feasible and effective procedure. After passing the initial learning curve (about 25–30 cases), laparoscopic approach permits to make the blood loss significantly lower and operative time comparable with traditional approach with the same early postoperative results.

FOS362
DOES MESENTERIC LYMPH INHIBIT OR PROMOTE GROWTH OF TRANSLOCATING BACTERIA?

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Introduction: In severe acute pancreatitis the pancreas can become infected with a range of bacteria. Lymph can act as a conduit for bacteria from the intestine. The mesenteric lymph (ML) draining from the intestine changes dramatically in composition during acute disease states. It is unknown whether these changes inhibit or promote bacterial growth in ML. The objective of this study was to determine the effect of acute and chronic disease-conditioned ML on the growth of commonly translocating bacteria.

Methods: Under sterile conditions the mesenteric duct was cannulated and disease-conditioned ML sourced from four animal models (n = 5 per group): i) Acute Pancreatitis [AP] (taurocholate ductal infusion model), ii) Hemorrhagic Shock [HS] (reversible 90 min hemorrhagic shock model), iii) Diabetes Mellitus [DM] (Streptozotocin Type I diabetes model of 5–8 weeks duration) and iv) Control [C] (normal lymph). Five bacterial species were studied: *E. coli*, *S. aureus*, *K. pneumoniae*, *E. faecalis*, and *P. aeruginosa*. Bacteria were seeded as low and high concentration inoculums into the disease-conditioned or control ML, and bacterial growth measured after incubation for 4 and 24 hours.

Results: In all ML groups, after a low concentration innoculation, the concentration of *S. aureus*, *E. faecalis*, and *P. aeruginosa* increased, while *E. coli* and *K. pneumoniae* were inhibited by control lymph. After a high concentration inoculation, bacterial growth was promoted in all disease conditioned ML, except that DM- and AP-conditioned ML inhibited the growth of *S. aureus* and *E. fecalis*. HS conditioned ML promoted the growth of all bacteria types at both low and high concentration inoculations.

Conclusion: There was a complex interaction between bacterial species, inoculum concentration, and disease state. Disease conditioned mesenterial lymph does not have a consistently inhibit or promote the growth of translocating bacteria. Further research will be required to develop strategies to prevent or treat bacteria in ML during severe illness.

FOS363
COMPREHENSIVE CHARACTERIZATION AND THE TRUE IMPACT OF NEURAL INVASION SEVERITY IN GASTROINTESTINAL MALIGNANCIES – A PATHOMORPHOLOGICAL COMPARISON WITH PANCREATIC CANCER

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Introduction: The UICC has recently added neural invasion (NI) as a novel parameter in the current TNM classification. Since NI is not commonly characterized within the gastrointestinal malignancies (GIM) except pancreatic cancer and there are few studies existing with its only focus on NI, the aim of this study was to determine the exact prevalence and severity of NI in GIM and determine the true impact of NI on the clinical outcome and prognosis of GIM patients and compare them with pancreatic cancer.

Methods: NI was characterized in H&E-stained tissue sections of 2046 patients with adenocarcinoma of the esophagogastric junction (AEG) type I-III, squamous cell carcinoma of the esophagus (SCC), gastric cancer, colon cancer, rectal cancer, cholangiocellular cancer (CCC), hepatocellular cancer (HCC) and pancreatic cancer (PCa). NI severity score was determined and related to patient's prognosis.

Results: Prevalence of NI in GIM showed an utmost high variability from 6% in HCC, 28% in colon and 34% in rectal cancer, 36% for AEG I and II, 37% for SCC, 38% for gastric cancer, 58% for CCC, 65% in AEG III and 100% in PCa. NI severity was detected to be a more powerful tool to then solely recording the presence of NI in patients with GIM. Increasing NI severity was associated with diminished survival only in gastric and pancreatic cancer after multivariate analysis including age, gender TNM and grading.

Conclusion: The prevalence and severity of NI strongly varies within gastrointestinal malignancies. NI severity has major impact on survival especially in pancreatic and gastric cancer. It seems obvious, that neural invasion is not a concomitant side feature in gastrointestinal malignancies and deserves special attention especially regarding better patient stratification and therapeutic decision making after surgery.

FOS364
EIGHTY LAPAROSCOPIC ROBOT-ASSISTED PANCREATECTOMIES

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Introduction: Laparoscopy has revolutionized abdominal surgery quickly becoming the standard approach for many

operations, especially when there is little need for fine intracorporeal suturing. The da Vinci surgical system overcomes most of the technical limitations of laparoscopy and provides the unique opportunity to test whether this approach can improve the outcome of pancreatic resections, which often require challenging dissection and complex digestive reconstructions.

Methods: 80 consecutive robotic pancreatic resections were performed between 10/2008 and 12/2011. There were 23 males (28.7%) and 57 females (71.3%), with a mean age of 58 yrs (range 24–80) and a mean body mass index of 24.6 Kg/m^2 (range 16.9–35.9). 30 patients underwent pancreaticoduodenectomy (PD) (38%), 36 distal pancreatectomy (DP) (45%), 6 total pancreatectomy (7%), 5 tumor enucleation (6%), and 3 central pancreatectomy (4%). Since our activity spans over a 3-year period, data were analyzed according to the time of surgery, to verify progress in the learning curve: 17 patients were operated on between 10/2008 and 09/2009, 22 patients between 10/2009 and 09/2010, and 41 patients during the last 15 months (10/2010–12/2011)

Results: No patient was converted to laparoscopy or open surgery. Mean operative time (OT) was 437.8 minutes. In the first period OT was 512 min for PD and 420 for DP. The mean number of lymph nodes examined (LN) was 16.8, 31.2 for PD and 11.9 for DP. Pancreatic fistula (PF) occurred in 41% of the patients. In the second, OT was 596 min for PD and 402 for DP. The LN was 16.7, 27.2 for PD and 10.0 for DP. PF was amounted 36.3%. In the third, OT was 583 min for PD and 288 for DP. The LN was 28.7, 36.0 for PD and 19.1 for DP. PF was amounted 36.6%. 44 patients were diagnosed with benign/low-grade tumors and 26 with cancer. Surgical margins were all negative. Post-operative mortality was nil, morbidity was 52%, mean hospital-stay was 16 days.

Conclusion: In selected patients laparoscopic robot-assisted pancreatic resections can be safely performed. Despite the existence of a learning curve, experienced pancreatic surgeons are not expected to pay to robotics the same price that they would have been asked for by laparoscopy.

FOS365
LONG-TERM OUTCOMES OF PANCREATIC INTERNAL SHORT STENT PLACED ACROSS THE PANCREATICOJEJUNOSTOMY FOLLOWING PANCREATODUODENECTOMY

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Introduction: Efficacy of internal drainage with pancreaticojejunostomy (PJ) has been recognized, however there have been few reports describing the long-term outcomes of an internal short stent placed across the PJ following pancreatoduodenectomy (PD). The purpose of this study is to clarify the long-term outcomes the short internal stents.

Methods: Fifty-seven patients that had internal short stents placed across the PJ following PD were retrospectively analyzed. The cumulative defecation and deciduation rates of the stent, complications in relation to delayed defecation of the stents, and predictive factors influencing the delayed defecation, delayed deciduation, and the distal migration of the stents were analyzed.

Results: Defecation of the stent was confirmed in 35 patients. The median defecation time from PD and cumulative defecation rate at 1 year were 14.8 months and 41%, respectively. The median deciduation time from PD and cumulative deciduation rate at 1 year were 13.1 months and 46%, respectively. Distal migration of the stent was observed in 7 patients: location of the migration was bile duct in 4 patients and afferent limb in 3 patients. Acute pancreatitis occurred in 2 patients with the stent remained in the remnant pancreatic duct. One patient encountered acute cholangitis due to stent migration to the bile duct and required percutaneous transhepatic cholangial drainage. A multivariate analysis showed that stitches in the pancreatic duct and jejunal mucosa ≥5, stents ≥5 Fr, and pancreatic fistula classified as either Grade B or C were independent predictive factors for delayed defecation of the stent. Stitches in the duct-to-mucosa anastomosis ≥5 was independent predictive factor for delayed deciduation of the stent. Stent ≥5 Fr was predictive factor affecting the distal migration of stent.

Conclusions: In more than half of patients, internal short stents were not defecated within 1 year. Retrieval of the stent should be considered following the migration of an internal short stent. Stent ≥5 Fr was independent predictive factor affecting delayed defecation and the distal migration of stent. Stitches in the duct-to-mucosa anastomosis ≥5 was independent predictive factor for delayed defecation and deciduation of stent.

FOS366
PROPOSAL OF NEW CLASSIFICATION OF INVASIVE INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM OF THE PANCREAS

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Introduction: Current WHO classification replaced invasive intraductal papillary mucinous neoplasm (IPMN) with IPMN with an associated invasive carcinoma. However, the definition of invasive IPMN is not well established yet, especially in a viewpoint of its relationship with pancreatic ductal adenocarcinoma (DAC). The authors investigated the clinicopathologic characteristics of IPMN with an associated invasive carcinoma according to tumor morphology and percentage of invasive component.

Methods: Data were collected from 45 patients who underwent surgery at Seoul National University Hospital with diagnosis of IPMN with an associated invasive carcinoma from 1995 to 2009. IPMN associated with an invasive carcinoma was designated as intraductal papillary mucinous carcinoma (IPMC) and DAC associated IPMN according to cutoff value of 50% of its invasive component by a specialized pathologist. Radiologic image, clinicopathologic characteristics including immunohistochemical staining for various oncogenesis markers, and survival outcomes were analyzed. Of 45 patients with IPMN associated with an

invasive carcinoma, 29 (64.4%) were classified as IPMC and 16 (35.6%) as DAC associated IPMN.

Results: IPMC revealed higher proportion of male patients (3.83 : 1 vs. 0.7 : 1, p = 0.015), main duct or mixed type IPMN (31.0% vs. 6.3%; p = 0.071), and higher grade of dysplasia in its intraductal portion (100% vs. 12.5%, p < 0.001) than DAC associated IPMN. DAC associated IPMN had higher rate of T3 or T4 tumors (93.8% vs. 55.2%, p = 0.008), lymph node metastasis (43.8% vs. 17.2%, p = 0.080), perineural invasion (75.0% vs. 27.6%; p = 0.002), and endolymphatic invasion (43.8% vs. 3.4%; p = 0.002) than IPMC. With immunohistochemical staining, DAC associated IPMN had higher expression of S100A4 (75.0% vs. 39.3%, p = 0.023), p53 (62.5% vs. 27.6%, p = 0.022) and lower expression of SMAD4 (18.8% vs. 82.8%, p < 0.001) and p16 (18.8% vs. 44.8%, p = 0.080).

Conclusion: IPMN with an associated invasive carcinoma in current WHO classification is composed of 2 distinct clinicopathologic subset which could be differentiated based on histologic morphology and percentage of invasive component. Unlike IPMC, its irrelevance in oncogenesis marker expression between intraductal and invasive portion of DAC associated IPMN suggests its separate pathway of evolution of invasive carcinoma regardless from its background IPMN.

FOS367
P53 ANALYSIS IS A BETTER PREDICTOR OF PROGNOSIS THAN HISTOLOGY IN PANCREATIC IPMN

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Introduction: The role of p53 in the development and progression of IPMN is unclear. Currently, radiological size and location (side branch/main duct) are the most quoted preoperative predictors of malignancy in IPMNs.

Methods: We aimed to investigate whether p53 mutational status can predict malignancy and outcome in IPMNs. 29 patients underwent resection for IPMN. p53 analysis was performed on intra-operatively collected pancreatic juice and frozen tissue samples taken from the resection specimens. p53 results were correlated with histological diagnosis and survival data.

Results: Histologically, there were 11 IPMNs, 7 IPMNs with invasive adenocarcinoma (IPMCs), 3 conventional PDACs and 8 other benign entities. Eight patients died (median follow-up: 730 days). Tissue sample p53 status correlated with histological malignancy (p = 0.0005). Tissue p53 predicted survival in IPMN and IPMC (p = 0.0001) and was a better predictor of survival than conventional histology (p = 0.01).

Tissue p53 mutational status matched that in juice in all but 2 cases (where mutation site lay within the primers). There were no false positive p53 results in pancreatic juice.

Conclusion: p53 mutational status can predict poor outcome in IPMNs, regardless of histological grade. Pancreatic juice analysis could potentially be used to identify those patients with IPMN who should be considered for resection.

FOS368
THE POTENTIAL OF METASTATIC LYMPH NODES TO PREDICT POSITIVE RESECTION MARGINS IN PATIENTS WITH RESECTABLE PANCREATIC CANCER

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Introduction: Despite progress during recent decades, long-term outcome of patients with pancreatic cancer remains dismal. Since positive resection margins and metastatic lymph nodes are known risk factors for early tumor recurrence, patients at risk should be identified and could potentially benefit from preoperative radio-chemotherapy. This study aimed to assess whether the presence of lymph node metastasis could be used to predict positive resection margins in patients with pancreatic cancer.

Methods: A series of 120 patients (68 male, 52 female, median age 67 years) underwent pancreatic head resection for various malignant diseases (pancreatic ductal adenocarcinoma, biliary cancer, periampullary cancer) at our institution from 2000 to 2010. Patients were identified from our prospective database that collects more than 60 single items of all patients undergoing pancreatic resection. Lymph node metastasis and positive resection margins were all confirmed by histological evaluation. Positive predictive value (PPV), negative predictive value (NPV), sensitivity and specificity were calculated to assess the predictive value of metastatic lymph nodes regarding tumor-free (R0) and tumor-involved (R1) resection margins.

Results: There were 86 specimens (72%) with tumor-positive lymph nodes and 34 specimens with tumor-negative lymph nodes. Resection margins were positive in 34 specimens (28%) and negative in 86 specimens. Sensitivity of tumor-positive lymph nodes to detect positive resection margins was 94%, and the NPV was also 94%. In contrast, specificity and the PPV were both 37%, respectively.

Conclusion: Patients with resectable pancreatic cancer, who have no lymph node metastasis, are at very low risk to have positive resection margins (2 of 34 patients, NPV 94%). In contrast, more than one third of patients with metastatic lymph nodes are at increased risk for an incomplete tumor resection (sensitivity 94%). If lymph nodes metastases are highly suspected at preoperative staging, a neoadjuvant treatment strategy should be considered to increase the R0 resection rate.

FOS369

THE UTILITY OF PANCREATIC PROTOCOL COMPUTERIZED TOMOGRAPHY SCANS FOR PREDICTING METASTATIC DISEASE OF PANCREATIC TUMORS: AN UPDATE USING CONTEMPORARY IMAGING TECHNOLOGY

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Introduction: Preoperative detection of metastatic disease, which precludes surgical resection, remains a limitation in the work up of pancreatic tumors. Technology in CT imaging has improved dramatically in the past decade. No recent study has assessed the ability of enhanced-resolution pancreatic protocol CT scans (PPCT) to detect metastatic disease. Therefore, the goal of the present study is to evaluate the accuracy of modern high quality PPCT in assessing pancreatic tumors for metastatic disease.

Methods: This is a single institution review of all patients who underwent PPCT and operative exploration for pancreatic adenocarcinoma and neuroendocrine tumors over a 5 year period using 64-slice or higher PPCT with three-dimensional reconstruction. PPCT results were correlated to operative findings.

Results: 823 patients underwent operative exploration after PPCT. 671 patients had adenocarcinoma and 152 had neuroendocrine tumors. For patients with adenocarcinoma and neuroendocrine tumors, 410 (61.1%) and 51 (33.6%) underwent pancreaticoduodenectomy, 101 (15.1%) and 82 (53.9%) distal pancreatectomy, 20 (3.0%) and 3 (2.0%) total pancreatectomy, 35 (5.2%) and 0 palliative bypass, and 105 (15.6%) and 16 (10.5%) underwent non-therapeutic laparotomy/laparoscopy, respectively. The accuracy of PPCT in detecting metastatic disease for adenocarcinoma and neuroendocrine tumors was as follows: sensitivity 31.4% and 83.3%, specificity 99.0% and 97.5%, negative predictive value 87.5% and 96.0%, and positive predictive value 86.1% and 89.3%, respectively.

Conclusion: Modern PPCT with 3-D reconstruction is a highly accurate method to identify metastatic disease in pancreatic tumors prior to planned surgical resection. All patients should undergo PPCT prior to operative exploration for pancreatic tumors. The sensitivity is lower for detecting metastatic disease in patients with adenocarcinoma than in neuroendocrine neoplasms. Since the sensitivity remains relatively low, other modalities may be of benefit in selected patients and should be further studied.

FOS370

POSTOPERATIVE PANCREATIC FISTULA RATE IS NOT HIGHER AFTER CENTRAL PANCREATECTOMY AS COMPARED TO SPLEEN PRESERVING DISTAL PANCREATECTOMY

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Introduction: Central pancreatectomy is a pancreas-sparing alternative to distal pancreatectomy in selected cases (i.e. benign and low-malignant lesions of the pancreatic body). However, it is considered to have the highest postoperative fistula rate of all pancreatic resections, making this procedure not widely used. The aim of the study is to assess the postoperative outcome after central pancreatectomy, as compared to spleen preserving distal pancreatectomy, mainly in regard with pancreatic fistula rates.

Methods: Twenty-two consecutives central pancreatectomies (group 1) were compared to 24 consecutives spleen preserving distal pancreatectomies (group 2) performed between 2002 and 2011 at Fundeni Clinical Institute, Bucharest. Pre, intra and postoperative data were retrospectively assessed for both groups from a prospective gathered electronic database. A detailed and comparative analysis of the postoperative outcomes was made between the two groups.

Results: There were no differences between the two groups in regard with age, sex, pancreas texture, pathology, tumor diameter and the mean follow-up time (49 months for group 1 vs. 41 months for group 2, $p = 0.3739$). However, a significant difference was found in regard with the length of the resected pancreas (5.5 ± 1.6 cm for group 1 vs. 9.3 ± 1.7 cm for group 2, $p < 0.0001$). No significant differences were found in regard with overall or severe morbidity (50% vs. 42% and 27% vs. 21%, respectively), overall or clinically significant pancreatic fistula rates (36% vs. 46% and 23% vs. 21%, respectively). Re-laparotomy rate was higher in group 1 (27%), as compared to group 2 (12.5%), but statistical significance was not reached ($p = 0.2757$)

Conclusion: Postoperative overall and clinically significant fistula rates after central pancreatectomy are not higher, as compared to spleen preserving distal pancreatectomy. However, re-laparotomy rate seems to be higher after central pancreatectomy. Central pancreatectomy is a reasonable alternative procedure to distal pancreatectomy for benign and low-malignant tumors of the pancreatic body, in selected cases.

FREE ORALS: OTHER

FOS371

PREDICTIVE FACTORS OF LIVER HYPERTROPHY AFTER PERCUTANEOUS PORTAL VEIN EMBOLIZATION (PVE) BEFORE RIGHT HEPATIC RESECTION: A SINGLE EXPERIENCE OF 202 CASES

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Introduction: Although PVE is accepted before major hepatectomy with small future remnant liver (FLR), predictive factors for hypertrophy of non-embolized FLR remains uncertain. We aimed to analyze factors of hypertrophy after PVE in a large homogeneous study in a single center.

Methods: From January 1999, 202 non jaundiced patients considered for right or extended right hepatectomy underwent contra lateral percutaneous PVE with N-butyl cyanoacrylate when FLR/total liver volume ratio (FLR%) was below 25% in normal liver or 40% in altered liver. Technical success of procedure, age, etiology of disease (liver metastasis, n = 81, HCC, n = 79, cholangiocarcinoma, n = 25, and others, n = 17), type and duration of chemotherapy (n = 73), prior TACE (n = 59), characteristics of the liver parenchyma (F3-F4 n = 69; Steatosis > 30% n = 37), and biological data were restrospectively evaluated as predictive factors for hypertrophy of FLR.

Results: Technical failure was observed in 20 (10%), including portal vein thrombosis or material migration in 11. After PVE, FLR volume significantly increased from 544 ± 199 cm^3 to 700 ± 238 cm^3 with FLR% from 34.1% to 44.1%. Liver hypertrophy was decreased in patients with incomplete PVE (OR 17.4, p = 0.018) and in cirrhotic patients (OR 3.2, p = 0.002), except if prior TACE were performed (OR 0.33, p = 0.033). In non-cirrhotic patients, there was no influence of age, diabetes mellitus, etiology of disease, liver steatosis. Multiple logistic regression analyses revealed that biological cholestasis (GGT > 5N) (OR 2.5, p = 0.016), low platelet count (<100 000) (OR 2.5, p = 0.043), and platin-based chemotherapy (OR 3.5, p = 0.021) were the significant negative factors for liver hypertrophy.

Conclusion: This large series showed that thrombopenia, biological cholestasis, and preoperative chemotherapy with platin agents could impair hypertrophy after technically successful PVE and confirmed that prior TACE could overcome impaired hypertrophy in cirrhotic.

FOS372

COMPLICATIONS OF LIVER HYDATID CYST EPIDEMIOLOGICAL, CLINICAL, PARACLINICAL AND THERAPEUTIC PROFILE

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Introduction: The liver hydatid disease is a common disease in Morocco, where it is a public health problem. It is considered benign but can be serious because of its complications.

Methods: In order to study the liver hydatid cyst (LHC) in our context and its complications, we conducted a retrospective study on 75 cases among 201 patients operated for LHC, for a frequency of 37.3%. The series consisted of 43 women and 32 men with a mean age of 38.4 years (range 15 to 84 years). Our patients were in 57.3% of cases from rural areas having contact with dogs in 82.7% and a history of hydatid disease in 9.33% of cases. Apart from a case of accidental discovery, the remaining patients had various clinical signs dominated by abdominal pain (94.67%). Radiological examinations had an important role in the diagnosis, including ultrasound completed by CT in our serie, it showed LHC complicated in 65.33% of cases.

Results: Complications were dominated by cystobiliary fistula (58.67%) and suppuration of the cyst contents (28%), followed by the rupture in the peritoneum (8%) and in the chest (5.33%). Treatment was surgical in all cases (100%) to eradicate the parasite and to treat the residual cavity and its complications. The surgical procedure was conservative (resection of the protruding dome) in the majority of cases (86.67%) whereas it was radical in 13.33% of cases (4 cystectomy, 5 pericystectomy and 2 partial hepatectomy). The postoperative course was simple in 84% of cases, while 16% of patients had postoperative complications dominated by external biliary fistula (58.33% of cases). The conservative techniques were complications with providers of posto.

Conclusion: Hydatid disease is often diagnosed at the stage of complications in our context, hence the importance of education as our outreach work.

FOS373

MECHANISM OF MELATONIN-MEDIATED ATTENUATION OF TRAUMA-HEMORRHAGE-INDUCED LIVER INJURY

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Introduction: Although melatonin treatment following trauma-hemorrhage or ischemic reperfusion prevents organs from dysfunction and injury, the precise mechanism remains unknown. The aim of this study is to elucidate whether melatonin-mediated attenuation of liver injury following trauma-hemorrhage is via Akt-dependent HO-1 pathway.

Methods: After a 5-cm midline laparotomy, male rats underwent hemorrhagic shock (mean blood pressure ~40 mmHg for 90 min) followed by fluid resuscitation. At the onset of resuscitation, rats were treated with vehicle, melatonin (2 mg/kg), or melatonin plus phosphoinositide 3-kinase (PI3K) inhibitor Wortmannin (1 g/kg). At 2 h after trauma-hemorrhage or sham operation, liver tissue myeloperoxidase (MPO) activity, alanine aminotransferase (ALT), asparate aminotransferase (AST), malondialdehyde (MDA) and adenosine triphosphate (ATP) were measured. Liver Akt, HO-1, and cleaved caspase-3 protein levels were also determined.

Results: Melatonin attenuated the trauma-hemorrhage-induced increase in liver MPO activity, levels of ALT, AST, MDA and ATP, which was blocked by co-administration of Wortmannin. Administration of melatonin normalized liver Akt phosphorylation and further increased HO-1 expression and decreased cleaved caspase-3 levels following trauma-hemorrhage. Co-administration of Wortmannin prevented the melatonin-mediated attenuation of shock-induced liver injury.

Conclusion: Our results collectively suggest that Akt-dependent HO-1 upregulation may play a critical role in melatonin-meditated liver protection following trauma-hemorrhage.

FOS374

INCIDENCE AND PREDICTORS OF POSTHEPATECTOMY LIVER FAILURE FOLLOWING MAJOR LIVER RESECTIONS

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Introduction: Liver failure is a potentially fatal complication following major hepatic resection. This study evaluates the incidence and factors associated with posthepatectomy liver failure (PHLF), as well as the outcomes and survival of these patients.

Methods: All patients who underwent elective major hepatic resection (>3 liver segments) between January 2001 and March 2011 from a single large UK centre were identified from a prospective database. PHLF was defined as bilirubin levels >100 micromol/L or INR >2 on 3 consecutive days within the first post-operative week. Patient demographics, comorbidities, clinical and pathological data were analysed. Outcome measures compared include ITU stay and survival.

Results: In this study 708 patients underwent major liver resections (PHLF = 54, control = 654). Compared to the control group, older patients, the presence of diabetes mellitus and preoperative portal vein embolization had a higher incidence of PHLF. There was no significant difference in pre-operative chemotherapy, Pringle manoeuvre, steatosis of background liver, or blood transfusion. Post-operatively, patients with PHLF were more likely to require dialysis (13.2% vs 1.8%, $p < 0.001$) and had longer ITU stay (mean 2.57 vs 0.84 days, $p < 0.001$). The PHLF group had higher 30-day (22.6% vs 3.1%, $p < 0.001$) and 90-day mortality (41.5% vs 4.7%, $p < 0.001$). Median overall survival was 9.86 months in the PHLF group and 49.77 months in the control group ($p < 0.001$).

Conclusion: This study over a 10-year period has shown a small risk of PHLF (7.6%) in patients undergoing major hepatic resection. Older patients, diabetes mellitus and preoperative PVE was associated with a significantly higher incidence of PHLF. This resulted in a significantly poorer 30-day, 90-day and overall survival.

FOS375

MEASURED VERSUS ESTIMATED TOTAL LIVER VOLUME TO PREOPERATIVELY ASSESS THE ADEQUACY OF THE FUTURE REMNANT LIVER

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Introduction: Systematic assessment of the future remnant liver (FLR) is essential before major or extended hepatectomy to reduce the risk of postoperative hepatic insufficiency. The FLR volume is usually expressed as the ratio to nontumorous total liver volume (TLV) which can be directly measured on CT (mTLV) or estimated based on the correlation existing with the body surface area (eTLV). Aim of the study was to determine which method of liver volumetry is more accurate in predicting a safe resection.

Methods: All consecutive, non-cirrhotic patients undergone major hepatectomy between April 2000 and December 2009 for whom i) preoperative CT scan and ii) weight and height were available entered the study. The mTLV (calculated as: TLV-tumor volume), was compared to the eTLV (calculated as: $-794.41 + 1267.28 \times$ body surface area) using volumetric data (cc) and the following outcome measures: hepatic insufficiency (HI) and 90-day mortality. Definition of HI was peakBil >7 mg/dL or, in patients with jaundice, an increasing bilirubin level on day 5 or thereafter.

Results: 199 patients underwent major (122) or extended (77) hepatectomies for biliary cancer (56), HCC (17), CRC mets (105), and other indications (21). 25 patients (12.5%) developed HI, while 7 (3.5%) died postoperatively. Compared to the eTLV, the mTLV underestimated the liver volume in 65.4% of cases ($P < 0.01$). Based on mTLV and eTLV 39 and 64 patients, respectively, would have needed a PVE which was used in 36 patients. In those 131 patients in whom both

methods did not evidence the need for PVE postoperative HI and mortality were 4.6% and 0.7%. In those 24 patients in whom the eTLV but not the mTLV predicted the need for PVE (and thus PVE was not performed) HI was significantly higher (25%) (P = 0.004) as was the postoperative mortality rate (4.1%).

Conclusion: Use of eTLV selects a subset of patients (~12%) at higher risk of HI and mortality in whom volumetric assessment with the mTLV do not reveal the need for a PVE.

FOS376
RATIONALE AND SURGICAL TECHNIQUE OF LAPAROSCOPIC LEFT LATERAL SECTIONECTOMY WITH ENDOSCOPIC STAPLE

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Introduction: Laparoscopic left lateral sectionectomy (LLLS) has been widely accepted due to benefits of minimally invasive surgery. Some surgeons like to isolate glissonian pedicles to segment 2 and 3 and control individual pedicles with surgical clips. But others like to control glissoinan pedicles to segment 2 and 3 at once with endoscopic stapling device without isolating each pedicles. The aim of this study is to find rationale (safety, outcomes, learning curve) of LLLS with endoscopic staples.

Methods: We retrospectively analyzed and compared the clinical outcomes (operation time, blood loss, hospital stay, learning curve, complication rate, etc) in 33 patients who underwent LLLS between April 2004 and December, 2011. We divided our patients depending on surgical technique whether isolate each glissonian pedicles (individual group, n = 20) or not (batch group, n = 13). To see the learning curve, we arbitrarily divided first and second half period (before and after December, 2009) depending on case number 17.

Results: There was one open conversion in individual group. Mean operative time was 265.3 ± 21.3 min (Mean ± SE) in the individual group and 170.0 ± 22.9 min in batch group. Operation time in batch group was significantly shorter than individual group (p = 0.007). There was no blood transfusion in batch group, but 4 out of 20 patients in individual group needed blood transfusion during surgery. Mean post-operative hospital stay were 10.7 ± 1.1 and 9.4 ± 0.8 days in individual and batch group (p = 0.46). Mean operative time in the first and second half of individual and batch group were 271.9 ± 28.9/254.3 ± 32.2 min and 209.0 ± 29.1/142.1 ± 30.7 min (first half/second half). In batch group, we could save operation time significantly (p = 0.027) in second half period.

Conclusion: The LLLS with endoscopic staple (batch group) was easy and safe technique with short learning curve and better outcomes without morbidity and mortality. We will show schematic pictures and video to support rationale for LLLS with endoscopic staples (batch group).

FOS377
RATIO OF IL 10 OVER IL 12 IS A NOVEL SURROGATE TO EVALUATE THE SEVERITY OF NON ALCOHOLIC STEATOHAPATITIS (NASH) – A PROSPECTIVE CLINICAL PILOT STUDY

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Introduction: Non alcoholic steatohepatitis (NASH) is a growing global epidemic progressing to cirrhosis, liver failure, HCC, warrants liver transplant. The natural history is still not well defined, inflammatory cytokines, intrahepatic immune traffic, degree of apoptosis and path of fibrogenesis are the sequel of the disease process. This study evaluates a novel inflammatory cytokines (IL 10 and IL 12) ratio to predict NAFLD to NASH and its severity index.

Methods: Ninety (n = 90) patients, mean age of 45 (28–54) were divided into Group A (n = 30) BMI (mean) <25% with normal lipids, healthy control. Group B NAFL D (n = 30) BMI > 29% with NAFLD (hepatic steatosis, Waist/Hip ratio >0.9, high lipids, HOMA > 1.8, mean normal ALT, AST, RBP4, 2.5, Leptin, Adiponectin, TNF alpha, serum NASH score <0.8, mean fibrotic score <0.1, mean IL 10/IL 12 ratio <0.9. NASH C (n = 30), BMI > 30, W/H ratio >1.1, high lipids, HOMA > 2.2, high AST, ALT, RBP > 4.5, high leptin, low adiponectin, high TNF alpha, IL10/IL12 ratio >2.5. Serums NASH score > 0.6, fibrotic score over 0.2. Liver biopsy in NASH group, macrovascular fat 18/30 (60%), ballooning 12/30 (40%), Mallory body 7/30 (23%), METAVIR score F2 12/30 (40%), F3 9/30 (30%), F4 3/30 (10%).

Results: IL 10/12 ratio correlated positively with the progression of NAFLD to NASH.

Conclusion: IL 10/12 ratio correlated positively with the progression of NAFLD to NASH. IL 10/12 ratio > 2.5 has NASH with high steatosis and fibrotic state and elevated inflammatory cytokines. Larger study will establish the predictive index of IL10/IL 12 NASH severity and prognosis.

FOS378
QUALITY OF LIFE STUDY POST CYTOREDUCTIVE SURGERY AND INTRAPERITONEAL CHEMOTHERAPY FOR PSEUDOMYXOMA PERITONEII

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Introduction: Our aim in this study was to evaluate the quality of life in patients following cytoreductive surgery and intraperitoneal chemotherapy for pseudomyxoma peritoneal.

Methods: We carried out telephone interviews with 51 patients and sent postal questionnaires to the remaining 36 patients that were uncontactable by telephone. The FACT C (version 4) quality of life questionnaire that included PWB (Physical Well-Being), SFWB (Social/Family Well-Being), EWB (Emotional Well Being), FWB (Functional Well Being)

and AC (Additional Concerns) was utilised. FACIT-TS-G (version 1) was also used.

In our institution 87 patients underwent cytoreductive surgery for pseudomyxoma peritoneii from 1997 to our most recent that were alive at the time of the study.

Results: A total of 63 patients (response rate 72%) were available for quality of life interview and analysis. 62% were female with an average age of 54 years. The median time since surgery was 31 months (range 6–161). 22% of patients had over one cytoreductive surgical procedure.

The median score on the PWB subscale was 2 (range 0–11), SD 3 with a maximum score of 28 aiming for the lowest score 0.

The median score on the SFWB, EWB and FWB subscale was 21, 6 and 23 respectively.

The median score on the FACIT –TS-G questionnaire was 21 (range 9–25), SD 4 with a maximum score of 25 aiming for the highest score 25.

25% of patients analysed had a stoma. The median score on FACT C AC subscale was 2 (range 0–4), SD 1 of maximum of 8 aiming for 0.

Conclusion: Our patients reported favourable outcomes from a physical, emotional, functional and social point of view. 79% of patients stated they would undergo further cytoreductive surgery if required. 13% were undecided at the time of the study.

FOS379
LONG-TERM RESULTS OF SPLENECTOMY WITH ESOPHAGOGASTRIC DEVASCULARIZATION IN PATIENTS WITH EXTRAHEPATIC PORTAL VENOUS OBSTRUCTION

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Introduction: Extrahepatic portal venous obstruction (EHO) is a common cause of portal hypertension in India. Esophagogastric devascularisation is the only surgical option in patients with variceal bleeding and no major shuntable vein. There is a paucity of data on the long-term results following these procedures. We analysed the short- and long-term results of Modified Hassab's procedure in patients with EHO.

Methods: From 1976 to 2010, 103 (64 males) patients with EHO underwent splenectomy with esophagogastric devascularization (Modified Hassab's procedure) if they had thrombosed splenic and superior mesenteric veins with recurrent bleeding despite endotherapy and/or symptomatic hypersplenism or when no shuntable vein was found during a planned shunt. Eleven (10.7%) of these had emergency procedures. The relevant data were extracted from a prospectively maintained database. An attempt was made from January 2009 to June 2011 to obtain up-to-date follow up information on all these patients. Patient characteristics, short-term results (operative morbidity and mortality) and long-term complications and their management were analyzed.

Results: The mean age was 20.8 years. The mean number of episodes of variceal bleeding prior to surgery was 2.8 (2.6). Fifty-five (53.4%) patients had hypersplenism, of which 10 were symptomatic. Postoperative morbidity occurred in 24 (28.1%) patients (elective: 18.5%; emergency: 63.6%). The operative mortality was 7.8% (elective: 4.4%; emergency: 36.4%; $p < 0.01$). Four patients rebleed in the early postoperative period, two each after elective and emergency procedures. Sixty-nine (72.6%) patients were followed up for a mean of 60 (range: 3–355) months. Rebleeding occurred in 14 (20.3%) patients and was managed with blood transfusion and endotherapy. Post splenectomy sepsis did not occur and no patient died of rebleeding during follow-up.

Conclusion: Splenectomy and esophagogastric devascularization is a fairly effective surgical option for patients with EHO who cannot undergo surgical shunts. Patients undergoing emergency procedures have significantly higher morbidity and mortality.

FOS380
POST-OPERATIVE VOLUMETRIC ASSESSMENT OF THE REMNANT LIVER AFTER A MAJOR HEPATECTOMY AND LIVER FUNCTION

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Introduction: It is largely accepted that the liver function is correlated to the liver volume after an hepatectomy. Indeed, post-operative liver volume (POLV) and/or its variation (deltaLV) is used as "end-points" to assess methods to prevent post-operative (po.) liver failure. Aim of this study was to assess if this linear relation between liver function and liver volume is always true. For this, we have compared POLV and deltaLV of patients with or without po. liver failure in a case-match study.

Methods: Between 2006 and 2010, 11 non-cirrhotic patients have developed po. liver failure defined by a bilirubin >50 µmol/L and protrombin time <50% at 5th po. day. POVL and deltaLV of these patients have been compared to those of 11 patients without po. liver failure with volumetric CT-Scan at 7th po. day. A matching (1 to 1) between the 2 groups of patients (liver failure, LF and non liver failure, NLF) was made for the gender, type of hepatectomy and the age.

Results: The 2-months po. mortality (LF vs NLF) was 7/11 (63%) vs 2/11 (18%) ($p = 0.08$). The intra-operative blood transfusion (N. of red pack cell) and clamping duration (LF vs NLF) were respectively: 4.3 ± 3.1 vs 3.2 ± 2.8 ($p = 0.4$) and 53 ± 51 vs 44 ± 26 minutes ($p = 0.6$). Just after the hepatectomy, the ratio of the remnant liver volume related to body weight (POLV/BW) (%) was 0.7 ± 0.3 in the LF group and 0.9 ± 0.3 in the NLF group ($p = 0.36$). At 7th po. day, the POLV/BW (%) was 1.3 ± 0.3 in the LF group vs 1.4 ± 0.3 in the NLF group ($p = 0.5$). At 7th po. day, the growth (%)

of remnant liver (deltaLV) was 190 ± 99 in the LF group and 170 ± 62 in the NLF Group (p = 0.53).

Conclusion: As the post-operative liver volume and liver volume variation at 7th po. day were not significantly different between patients that developed or not a po. liver failure after major hepatectomy, these volumetric data could not be used as a method to assess the liver functional reserve post-operatively.

FOS381
PREOPERATIVE MEASURED BLOOD HGF MAY PREDICT THE POSTOPERATIVE COURSE OF LIVER REGENERATION

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Introduction: Liver failure is a major cause of mortality after partial hepatectomy (PH). Resections up to 75% of the organ is possible, still the identification of the patients with increased risk of postoperative liver failure and therefore development of complications is difficult. PH triggers the sequence of events which leads to proliferation of cells and restoration of liver volume. Hepatocyte growth factor (HGF) plays a key role in the regeneration of the liver. Therefore its course after PH was analyzed.

Methods: The postoperative course of patients who underwent PH for different reasons has been analyzed in this prospective study.

Before the operation, as well as at 6 hours, and the postoperative day 1, 2, 3, 5, 10, 14 and 85 the maximal liver function capacity using the new LiMAx test as well the serum levels of HGF and the routine liver blood values were analyzed. Also complications according to the classification of surgical complications by Daniel Dindo were analysed.

HGF serum level was assessed by a commercial Quantikine Human HGF Immunoassay (R&D Systems, ELISA). Patients were divided in three groups according to the postoperative liver function regeneration at day 10 ((LiMAx (POD 0)/(POD10)), group 1: 0–50%, 2: 50–100% and group 3: >100%).

Results: Till now 38 Patients were included into the study. The patients of group 1 had significant higher HGF serum level preoperatively compared to group 3. This two groups differ in terms of severe postoperative complications (Dindo > II) too. The LiMAx value at 6 hours and 1 day correlates significantly with the corresponding HGF serum level. The postoperative course of LiMAx values as well as in HGF serum level after PH depends on the extension of the liver resection.

Conclusion: HGF serum level correlates with the course of liver function regeneration after PH. Preoperative high HGF serum level might predict the occurrence of postoperative liver failure. Further analyses are needed to fully understand this aspect of the role of the HGF in liver regeneration.

FOS382
LONG-TERM RESULTS OF PROXIMAL SPLENORENAL SHUNT IN PATIENTS WITH EXTRAHEPATIC PORTAL VENOUS OBSTRUCTION

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Introduction: Extrahepatic portal venous obstruction (EHO) is a common cause of portal hypertension in India. Although this disease affects the young and does not cause liver dysfunction, death is usually due to variceal bleeding. We analysed the short- and long-term results of proximal splenorenal shunt (PSRS) in patients with EHO.

Methods: From 1976 to 2010, 832 (576 male; 69%) patients with EHO who either had a history of variceal bleeding or high risk varices, growth retardation and/or symptomatic hypersplenism underwent a proximal splenorenal shunt. Forty-one (5%) of these were emergency procedures. The relevant data was extracted from a prospectively maintained database. An attempt was made from January 2009 to November 2011 to obtain up-to-date follow up information on all these patients. Patient characteristics, postoperative outcome and long-term complications and their management were analyzed.

Results: The mean age, symptom duration and episodes of variceal bleeding were 18 years, 7 years and 3 respectively. The incidence of fundal varices was significantly higher (p < 0.001) in patients who had prior endotherapy. Although 57% patients had hypersplenism, only 8% were symptomatic. Postoperative morbidity and mortality were 10% and 1.2% (elective – 0.9%; emergency – 7%) respectively. Mean hospital stay was 7.5 days. Among 73% patients followed up (mean: 69 months), hypersplenism was reversed in all, rebleeding occurred in 9.4% and further endotherapy was obviated in 93%. Liver function remained normal in all and none developed post-splenectomy infection or encephalopathy. Both the 15-year overall and 'bleed-free' survival were ≥96%.

Conclusion: In patients with EHO, proximal splenorenal shunt provides safe, effective and durable prophylaxis from variceal bleeding. In the long-term, PSRS obviates the need for further endotherapy or blood transfusions in >90% and ensures a 15-year overall survival of >95% in these patients.

FOS383

3D MICROSURGICAL ANANTOMY OF THE CAUDATE LOBE IN COLORED SILICONE-INJECTED LIVER SPECIMENS

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Introduction: Modern hepatobiliary surgery is challenged by the complex anatomy of the caudate lobe. With the advent of major hepatic surgery, leading to safe hepatectomies and transplantation procedures, the caudate is a crucial structure during hilar colangiocarcinoma resection and living-related transplantation.

The inferior margin of the hilar fissure is the location of many microantomical structures as the caudate portal vessels, caudate arterial supply and caudate biliary ducts.

Methods: To highlight this microanatomy, isolated cadaveric livers injected with colored with silicone (blue – vena cava, red – hepatic artery and green – bile ducts) were used. The dissection was performed under microscopic vision (Karl Zeiss, Germany) of 10X, using microsurgical instruments (Codman, USA). 3D images have been produced with a W 3D Fuji camera (Japan) and A Nikon D 5100 (12.4 Mpixels) with a 100 mm micro lenses (Nikon Corp., Japan). StereoPhoto Maker, Version 4.3 was used to produce anaglyphic 3D images for projecting or printing. Our focus was the microsurgical anatomy of the caudate portal/arterial vessels and the caudate biliary duct.

Results: Normally the main portal branch for the caudate arises from the beginning of the left portal vein. Accessory portal branches were seen arising from the portal bifurcation and from the proximal right portal vein. A dominant arterial vessel was observed entering the Spiegel lobe together with the dominant portal vessel forming a Glissonian pedicle for the caudate. The caudate duct can drain to the left or right hepatic duct, crossing the inferior lip of the hilar fissure.

Conclusion: Colored-silicone injected cadaveric specimens, dissected under microscopic guidance, are an auxiliary anatomical model to study the microsurgical anatomy of the caudate lobe and its vessels and ducts.

FOS384

EFFECT OF PERIOPERATIVE STEROIDS ON ISCHEMIA-REPERFUSION INJURY AND SURGICAL STRESS RESPONSE FOR PATIENTS UNDERGOING LIVER SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Because of their association with morbidity, hepatic ischemia-reperfusion and surgical stress response have been addressed through several therapeutic strategies, such as ischemic preconditioning and pharmacological interventions. The role of steroids in this setting remains controversial. Accordingly, we conducted a systematic review and meta-analysis of the literature investigating the impact of perioperative administration of steroids to patients undergoing liver surgery.

Methods: We conducted a comprehensive literature search in highly solicited databases, identifying studies comparing perioperative steroids to standard care or placebo. We included randomized controlled trials (RCTs), quasi- and non-RCTs. Critical appraisal and meta-analysis were carried out according to the in the Preferred Reporting Items for Systematic reviews and Meta-analyses (PRISMA) statement. Pooled risk ratios (RR) and weighted mean differences (WMD) were calculated for dichotomous and continuous outcomes, respectively. Fixed or random effect models were applied, depending on heterogeneity between studies.

Results: Eight articles were retained. Seven were RCTs. Pooling the results revealed that patients receiving glucocorticosteroids were 30% less likely to suffer postoperative morbidity compared to controls (RR = 0.7, 95% confidence interval (CI): 0.54–0.93, p = 0.01). In addition, steroids significantly reduced postoperative blood levels of total bilirubin (WMD = −10 micromoles/l 95%CI: −19 to −1.0, p = 0.03), and of interleukin-6 (IL-6) (WMD = −81.8 pg/ml 95%CI: −112 to −51.5, p < 0.001). Lastly, there was no evidence supporting a risk difference in infectious complications, wound healing, and length of hospital stay between study groups.

Conclusion: This meta-analysis shows that perioperative steroids favorably impact on postoperative outcomes after liver surgery, both on a clinical and biochemical standpoint. Further studies are warranted, in order to confirm our findings and define subgroups more likely to benefit from the intervention.

FOS385

FUNCTIONAL AND MORPHOLOGICAL INVESTIGATION OF LIVER HYPERTROPHY AFTER PORTAL VEIN EMBOLISATION

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Introduction: Portal vein embolisations are more and more often performed prior to major liver resections to induce hypertrophy of the remnant liver. The success of a portal vein embolisation can only be investigated by imaging techniques such as CT-volumetry. This study explores the pertinence of the LiMAx-test, a metabolic 13C-Methacetin respiratory test, to functionally examine the induced hypertrophy over time.

Methods: 18 patients with portal vein embolisation of the right portal vein prior to major liver resections were included. Indications for the right hemihepatectomies included colorectal metastases (n = 9), Klatskin tumors (n = 5), HCC (n = 1), CCC (n = 2) and liver metastases of other cancers (n = 2). The function of the liver was investigated with the LiMAx test prior to the embolisation, 24 hours after embolisation

and directly prior to the resection. The CT-volumetry of the right and left liver was performed prior to the embolisation and prior to the resection. Volumetry was performed using OsiriX® software.

Results: The average LiMAx-value prior to the portal vein embolisation was 399 µg/h/kg, postinterventionally 309 µg/h/kg and directly preoperatively 372 µg/h/kg ($p < 0.05$). The average time between embolisation and resection was 32 days (SD 11 days). In this time, the remanent left liver volume significantly increased from 486 ml to 700 ml in average ($p < 0.001$), whereas the right liver volume significantly decreased (mean 1163 ml to 977 ml, $p < 0.01$). The postinterventional smaller LiMAx-value can be explained by the loss in function of the right liver which is also represented in the decrease in volume after some time. The increase of the LiMAx-value after regeneration proofs the hypertrophy of the remanent liver which is also shown by the CT-volumetry.

Conclusion: In comparison to imaging techniques such as CT-volumetries the LiMAx-test has the major advantage of monitoring the progress in hypertrophy not only in size but also in function. This may help find the optimal time point for the postinterventional resection.

FOS386
LIVER FAILURE AFTER MAJOR LIVER RESECTION: BILIRUBIN VALUES EARLY PREDICT MORTALITY

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Introduction: Liver failure (LF) is the first cause of death after liver resection (LR). Liver function test's values have been analyzed to early predict lethal LF, but there is no consensus about their interpretation. To assess the reliability of total bilirubin (TB) and prothrombin time (PT) values during the first postoperative week in predicting LF-related mortality.

Methods: 278 consecutive patients undergoing major LR (>3 Couinaud segments) between January 2005 and August 2011 were considered. Patients with preoperative TB >3 mg/dl (n = 25), no LF-related death (n = 3) and LF secondary to vascular thrombosis (n = 2) were excluded. The remaining 248 patients were included.

Predictive factors of 90-day mortality were analyzed, including TB and PT values on postoperative day (POD) 1, 3, 5 and 7 and the ratio of their values between different POD. ROC curve analyses were performed to define the optimal cut-off value of any significant variable. The 50–50 criteria (TB > 50 µmol/L and PT < 50%) on POD 5 (50–50) and the TB peak >7 mg/dL within POD 7 (PeakTB7) were also considered.

Results: Mortality rate was 2% (5 patients). TB on POD 3, 5, 7 were associated with mortality ($p = 0.001$, $p < 0.001$, $p < 0.001$). ROC analyses showed higher AUC for TB POD5 vs. POD3 (0.954 vs. 0.896), but cut-offs (3 mg/dL for both) had similar sensitivity (Se) and specificity (Sp) (80% and 89.3% vs. 80% and 88.4%). For TB POD7 (AUC 0.981) cut-off 4.5 mg/dL had 80% Se and 96.7% Sp. The ratio TB POD7/POD3 predicted mortality ($p < 0.001$, AUC 0.948); its cut-off 1.25 had 80% Se and 92.9% Sp. PT on POD 3, 5, 7 predicted mortality ($p < 0.05$) but no adequate cut-offs were identified. 50–50 and PeakTB7 had low Se (40%). At multivariate analysis TB POD7 > 4.5 mg/dL and TB POD7/POD3 > 1.25 were independent predictors of mortality (OR 40.24, $p = 0.004$ and OR 15.26, $p = 0.035$).

Conclusion: Early prediction of LF-related mortality after major LR should rely on TB values more than on PT ones. TB > 3 mg/dL on POD 3 allows a preliminary evaluation with good Se and Sp, similar to those of TB values on POD 5. Anyway, the optimal risk assessment should be performed on POD 7: TB values >4.5 mg/dL and ratio TB POD 7/POD3 > 1.25 are the strongest predictors of LF-related mortality.

FOS387
SURGICAL TECHNIQUES FOR COMPLETING ANATOMICALLY ACCURATE LAPAROSCOPIC SEGMENTECTOMY OF THE LIVER

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Introduction: Hepatic segmentectomy has played an important role in maximizing the post-operative functional hepatic reserve without reducing the curability. However, laparoscopic surgical techniques to complete anatomically accurate segmentectomy have not yet been well established.

Methods: Data of 62 patients who had undergone laparoscopic segmentectomy (LS) were reviewed. LS was defined as complete removal of the Couinaud's segment, in which the corresponding hepatic veins are exposed on the raw surface. The laparoscopic approach was facilitated by using intraoperative ultrasonography for each segment and by placing intercostal trocars to expose the root of the right hepatic vein for segmentectomy VII and VIII (the lateral approach). Recently, fluorescent imaging technique was used to identify hepatic segment by injecting indocyanine green (ICG, 0.25 mg) into a segmental portal branch (positive staining) or by administering ICG (2.5 mg) intravenously after clamping a segmental portal pedicle (negative staining).

Results: Surgical procedures of the 62 LS included 36 segmentectomies (from segment I to VIII), 16 bisegmentectomies of the right lobe, and 10 subsegmentectomies. Conversion to open surgery was required in 3 patients (segmentectomy IVa, VI, and VII). When 26 LS of the superior/posterior hepatic (sub)segments (I, IVa, VII, and VIII) were compared to the remaining 36 LS, the former group required a longer operation time (240 [132–390] in. vs. 155 [90–360]) in, $P < 0.01$) and showed an increased amount of blood loss (350 [20–1500] L vs. 100 [10–1100] L, $P = 0.02$). Positive and negative staining techniques with ICG-fluorescent imaging clearly delineated hepatic segments during laparoscopic procedures.

Conclusion: LS is feasible and safe, although difficult procedures such as resection of superior/posterior hepatic segment should be left to surgeons with advanced techniques both in open and minimally invasive surgery. The lateral approach for segmentectomy VII and VIII and fluorescent

imaging technique may further enhance the safety and accuracy of LS.

FOS388
OMENTAL FLAP WRAPPING OF THE CUT SURFACE OF THE LIVER IS EFFECTIVE IN REDUCING DELAYED GASTRIC EMPTYING AFTER LEFT-SIDED HEPATECTOMY

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Introduction: Delayed gastric emptying (DGE) is a common complication following left-sided hepatectomy. Adhesion between the stomach and the cut surface of the liver is considered to be the cause of the disruption of normal gastrointestinal movement. In this report, we analyzed the feasibility and safety of our procedure using omental flap wrapping with fixation to the cut surface of the liver, in order to ameliorate DGE after left-sided hepatectomy.

Methods: Between January 2000 and December 2010, 24 of 49 patients undergoing left-sided hepatectomy were treated with omental flap wrapping with fixation to the cut surface of the liver, to prevent its adhesion to the stomach and duodenum. Clinicopathologic risk factors for DGE after left-sided hepatectomy were identified using univariate and multivariate models, and compared to 25 patients without an omental flap retrospectively.

The greater omental flap, based on the right gastroepiploic vessels, was made by dividing the left side of the greater omentum from the transverse colon and the stomach by using ultrasonic coagulation shears. The cut surface of the liver was wrapped with the greater omental flap, using 8–10 sutures.

Results: There was a significant difference in the incidence of DGE between the patients with (4.1%) and without an omental flap (36%). The incidences of gastric distension and use of prokinetic drugs were also significantly lower in patients with an omental flap as compared to the patients without. Patients with an omental flap resumed a solid diet significantly earlier than those without. Univariate analysis revealed no omental flap, lymph node clearance, and left hemihepatectomy to be associated with postoperative DGE. Multivariate analysis showed the no omental flap to be the only independent significant factor (odds ratio, 21.23; $p = 0.0002$).

Conclusion: To conclude, omental flap wrapping with fixation to the cut surface of the liver is safe procedure and an independent significant factor associated with DGE. It seems that omental flap wrapping with fixation reduce the incidence of DGE after left-sided hepatectomy; however, further investigations, including a prospective randomized controlled trial, are needed to verify these conclusions.

FOS389
VASCULAR OCCLUSION VERSUS NO VASCULAR OCCLUSION FOR LIVER RESECTIONS

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Introduction: There is considerable controversy regarding whether vascular occlusion should be used during elective liver resections because of concerns about the safety and efficacy of the procedure. The aim of this review was to assess vascular occlusion during elective liver resections.

Methods: The Cochrane Hepato-Biliary Group Controlled Trials Register, the Cochrane Central Register of Controlled Trials (CENTRAL) in The Cochrane Library, MEDLINE, EMBASE, mRCT and Science Citation Index Expanded were searched until September 2011. Only randomised clinical trials were included. Two authors independently assessed trials for inclusion and independently extracted the data. Data was analysed with both the fixed-effect and the random-effects models using RevMan Analysis. Risk ratio (RR), mean difference (MD), or standardised mean difference (SMD) was calculated with 95% confidence intervals (CI) based on intention-to-treat or available case analysis.

Results: A total of six trials (of high bias-risk) were identified involving 356 participants undergoing liver resection comparing vascular occlusion (n = 180) versus no vascular occlusion (n = 176). With regards to primary outcomes, there was no significant difference in short-term mortality (RR 0.56; 95% CI 0.12 to 2.55), long-term mortality (HR 0.99; 95% CI 0.68 to 1.44) or in the difference in the number serious adverse events (rate ratio 0.77; 95% CI 0.37 to 1.59). Quality of life was not reported in any of the trials. With regards to secondary outcomes, there was no significant difference between the two groups with regards to the number of people requiring transfusions (RR 0.75; 95% CI 0.56 to 1.00) but the blood transfusion volume requirements were significantly lower in the vascular occlusion group when compared to the control group (SMD −0.44; 95% CI −0.81 to −0.07). There was no significant difference in blood loss between the two groups (MD −0.04 litre; 95% CI −0.11 to 0.04), nor was there any difference in hospital stay (MD 0.23 days; 95% CI −1.13 to 1.60) or operating time (MD −45.86 minutes; 95% CI −95.60 to 3.88). Return to work was not reported in any of the studies.

Conclusion: Intermittent vascular occlusion seems safe in liver resection and appears to reduce transfusion requirements. However, it does not seem to decrease morbidity. More randomised trials are needed to assess the impact of vascular occlusion on the mortality, morbidity, and quality of life.

FOS390

PROSPECTIVE ASSESSMENT OF THE INDOCYANINE GREEN'S CAMERA FOR THE INTRAOPERATIVE DETECTION OF SUBCAPSULAR PRIMITIVE AND SECONDARY LIVER TUMOR

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Introduction: Indocyanine green (ICG) is a vital dye excreted in bile that could be trapped around or into liver tumor. The presence of the dye at the surface of the liver can be detected using an infrared ICG camera. The aim of this prospective study was to evaluate the usefulness of this camera for the intraoperative detection of superficial and/or subcapsular hepatocellular carcinoma (HCC) or liver metastasis (LM).

Methods: Between November 2010 and June 2011, 39 patients underwent a hepatectomy with diagnosis of HCC (n = 8) or LM (n = 31). After the mobilization of the liver, intraoperative ultrasound and palpation were routinely performed before an exploration of the liver surface with the ICG camera. The surgical strategy impact of this method and histological analysis of resected areas were assessed.

Results: Among patients with LM (n = 31), the camera had identified additional superficial "spot" in 4 patients (13%). Resection of these "spots" had changed surgical strategy in all cases and histological analysis diagnosed LM in 3/4 cases. Among patients with HCC (n = 8), additional spots have been demonstrated in 5 patients (62%). Resection of these spots had changed surgical strategy in 4/5 patients and malignancy were found in 2/5 cases at histological analysis.

Conclusion: The indocyanine green fluorescent imaging is a technological innovation that increases the sensitivity of the exploration of the liver surface. The diminution of the size of this camera will create new perspectives in the evaluation of liver surface by laparoscopy.

FOS391

POST-HEPATECTOMY LIVER FAILURE: IS THE RELATIONSHIP BETWEEN LIVER FUNCTION AND LIVER VOLUME STILL THE SAME BEFORE AND AFTER HEPATECTOMY?

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Introduction: The risk of posthepatectomy liver failure is related to the volume of the remaining liver. This work aims to establish a quantitative relationship between the early liver function of the remaining liver, estimated from the elimination of indocyanine green (IG), and the liver mass removed.

Methods: In 32 rats (Wistar – 260 g), a laparotomy or a hepatectomy with removal of 30, 70, 85% of the liver mass or a 85% hepatectomy + splenectomy were performed. The liver function was evaluated at H24 after hepatectomy by two different methods: measurement of the overall hepatic metabolism through the retention rate of plasmatic IG at 15 min (IG15); measurement of the hepatocyte function independently of the remaining liver volume by quantification of the residual infrared fluorescence intensity (Fluo) of a pre-operatively injected IG. These data were correlated with the hepatocyte proliferation index (BrdU) at H24 after 0, 30 and 70% hepatectomy.

Results: The postoperative mortality was zero. At H24 after 0, 30, 70, 85 or 85% hepatectomy + splenectomy, IG15 (in %) was of 6 ± 2, 26 ± 3, 43 ± 7, 49 ± 1 and 54 ± 4 ($p = 0.01$) and FLUO (expressed in arbitrary units) was of 16 ± 1, 32 ± 10, 76 ± 15 and 35 ± 7 ($p < 0.0001$), respectively. Hepatocyte proliferation index at H24 was of 0, 222 ± 30 and 1641 ± 169. Thus, from 30% hepatectomy on, the overall hepatic metabolism decreased in the remaining volume and splenectomy degraded the liver function. Above 30% of mass removed, the hepatocyte function declined with the importance of the hepatectomy and was improved by the splenectomy. The splenectomy, however, decreased the IG uptake by reducing the portal flow and altered the measurement of the function.

Conclusion: When this hemodynamic bias was bypassed by a preoperative IG injection, the Fluo measurements demonstrated a beneficial effect of splenectomy on the hepatocyte function.

After major hepatectomy, the decline in liver function is due to the decrease in liver volume and an impairment of the hepatocyte function, a parameter improved by splenectomy. This drop in liver function could be due to a cell division process unfavorable to an efficient metabolism.

FOS392

EVALUATION OF STRESS RESPONSE IN LAPAROSCOPIC LIVER SURGERY: A PROSPECTIVE STUDY OF INFLAMMATORY PROFILE, COAGULATION HOMEOSTASIS AND CLINICAL OUTCOME

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Introduction: An inflammatory and hypercoagulability state develop after surgery, and their biological mediators are cytokines. Laparoscopy has been introduced in clinical practice, showing advantages over the open technique. However, benefits of the laparoscopic approach for liver resections remain to be demonstrated. This is a case-matched analysis concerning the short term outcome of laparoscopic and open liver resections in terms of clinical outcome, inflammatory profile and coagulation homeostasis.

Methods: 68 liver resections have been enrolled. 34 were assigned to the laparoscopic approach (LLR). The further 34 to the open procedure (OLR). The 2 groups were matched for: extent of resection, liver function, tumour histology and size. Outcome measures were: operating time, intraoperative blood losses and transfusions, tumour exposure at the tran-

section surface, surgical margin, hospital stay, morbidity rate, analgesic therapy, time of mobilization, fasting duration and time of first flatus. Plasma samples were collected pre and postoperatively for the assessment of liver function (bilirubin, transaminase), inflammatory (IL6, TNF, WBC, CRP) and coagulation impairment (platelets, D-dimer, fibrinogen, antithrombin III, prothrombin time).

Results: Postoperative plasma levels of transaminase, white blood cells count, C-reactive protein, Interleukin 6, prothrombin time and fibrin D-dimer showed a lower rise in LLR group compared to OLR group. Intraoperative blood losses, blood transfusions rate, analgesic therapy amount, time of mobilization, fasting duration, time of first flatus and overall morbidity resulted lower in LLR group. The decrease of platelets count, antithrombin III and fibrinogen levels was lower in LLR group than in OLR group. Postoperative plasma levels of total bilirubin and Tumour Necrosis Factor, along with operating time, tumour exposure at the transection surface and minimal surgical margins resulted comparable between the two groups.

Conclusion: The laparoscopic approach for liver resections seems to result in improved clinical outcome, lower inflammatory stress response and lower coagulation alterations. Thus, in the near future, laparoscopy may become the gold-standard approach for selected liver resections.

FOS393
COMBINED MAJOR HEPATECTOMY WITH NEPHRECTOMY. INDICATIONS AND POSTOPERATIVE OUTCOME

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Introduction: Combined major hepatectomy with nephrectomy (MHN) is uncommon. Aim of the study was review of our experience with combined major hepatectomy and nephrectomy in patients with simultaneous liver and kidney malignances. Recent postoperative outcome and long term survival were assessed.

Methods: Records of patients who underwent MHN at our clinics between January 2008 and May 2011 were examined. Nine patients underwent MHN. Mean (±SD) age was 54.9 ± 12.8 years, 5 were women, and 4 presented with comorbidities. Most kidney neoplasms were renal cell carcinomas of the right kidney (n = 8) with a mean diameter of 15.0 ± 5.1 cm. The most common indications for hepatectomy were direct liver invasion in eight patients and distant hepatic metastases in 1 patient; liver tumors were 6.5 ± 3.4 cm (mean ± SD) in diameter. One patient underwent combined left nephrectomy with distal pancreatectomy and splenectomy and resection of colon with right hepatectomy.

Results: Mean (±SD) operative time was 8.4 ± 2.5 hours. All liver resections included were right hepatectomies. In all cases, tumor negative hepatic margins were achieved. Median operative blood loss was 1,500 mL (range 200 to 3,000 mL). There was no perioperative death. In 4 patients developed reactive pleuritis, in one patient – wound infection, in 2 patients was lymph leak from the kidney bed, 1 patient suffered severe small for size syndrome. All complications were managed conservatively. Mean hospital stay was 13 ± 8.8 days. All patients are still alive.

Conclusion: In specialized centers combined MHN may be considered as acceptable and safe procedure in properly selected patients for combined resection for synchronous neoplasms of the kidney and liver.

FOS394
DEVELOPMENT AND VALIDATION OF A PREDICTIVE SCORE FOR POSTOPERATIVE INFECTIOUS COMPLICATIONS FOLLOWING HEPATECTOMY

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Introduction: Postoperative infectious complications (PICs) following surgery are associated with significant morbidity, increase the length of hospital stays, and have a negative impact on long-term oncological outcome. The aim of this study was to determine the risk factors for PICs following hepatectomy, and to develop and validate with an external database an applicable score based on simple parameters.

Methods: Between January 2006 and December 2009, 555 patients underwent elective hepatectomy. We prospectively collected and retrospectively analyzed demographic data, pathological variables, associated pathological conditions, and preoperative, intraoperative, and postoperative variables. The dependent variables studied were the occurrence of PICs, defined as development of one or more of the following conditions: pneumonia, septicemia, venous catheter infection, urinary tract infection, wound infection, and intraabdominal collection. PICs were devised in medical (PIMCs) and surgical (PISCs) complications. The incidence of PICs and validation of the predictive score were determined using an external prospective database of 342 patients.

Results: The multivariate analysis identified 3 independent risk factors for PICs: the presence of a nasogastric tube (OR = 1.8), blood transfusion (OR = 1.9), and diabetes (OR = 2.4). The multivariate analysis identified only one independent risk factor for PISCs: an associated portal venous resection (OR = 5.5). The multivariate analysis identified 4 independent risk factors for PIMCs: presence of a biliary drainage (OR = 1.9), blood transfusion (OR = 2.1), diabetes (OR = 2.9), and presence of atrial fibrillation (OR = 3.6). According to the 3 predictive factors, the observed rates of PICs ranged from 18.8% to 77.8% and ranged from 24.2% to 100% in the external database. Predicted and observed risks of PICs were very similar.

Conclusion: The correction of modifiable risk factors among the identified factors could reduce the incidence of PICs and, as a consequence, improve patient outcomes and reduce the length of hospital stays.

FOS395

COMBINED MAJOR HEPATIC RESECTION AND MAJOR VASCULAR RESECTION USING IN-SITU COLD PERFUSION OF THE LIVER

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Introduction: In situ hypothermic liver perfusion is useful for the resection of tumours involving the hepatic venous outflow, retrohepatic vena cava or porta hepatis where total hepatic vascular isolation is required. Having previously described the technique in detail, we now present our results from 17 patients over a 6 year period.

Methods: A prospectively-collected database of all patients undergoing hepatic vein or caval resection between October 2005 and October 2011 (n = 26) at Toronto General Hospital identified 17 patients who underwent in situ hypothermic liver perfusion. Primary end-point analysis was 30-day or in-hospital mortality. Secondary endpoints included morbidity, vascular graft complications, length of stay (LOS), post-hepatectomy liver failure (PHLF-as defined by the ISGLS) and renal failure, disease recurrence and overall survival (OS).

Results: Median follow-up was 13.8 months. 14 patients had major hepatectomies and 3 had primary caval resection. Four patients have died: two in-hospital (at 66 and 120 days), one of recurrent disease at 14 months and one of an unrelated new primary at 29 months. 4 patients experienced major complications, 3 required re-operation. 10 patients developed PHLF (grade A = 7, grade C = 3). PHLF was predictive of increased LOS (median 7 vs 22 days) and morbidity. Median OS for the cohort was 19.8 months. 7 patients progressed during the follow-up period, 5 patients with recurrent disease and 2 patients whilst awaiting a planned second stage procedure. Of the 3 patients with cholangiocarcinoma, two recurred within 8 months and one died in hospital.

Conclusion: In-situ cold perfusion is a safe technical tool for the resection of otherwise unresectable tumours. PHLF is a significant concern that predicts both morbidity and mortality in this patient group; patient selection is critical. Oncologic outcomes are acceptable especially considering the advanced nature of these patients underlying malignancies.

FOS396

IS CLOSE MONITORING IN THE INTENSIVE CARE UNIT NECESSARY AFTER ELECTIVE LIVER RESECTION

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Introduction: Many surgical patients are admitted to the intensive care unit (ICU), resulting in an increased demand, and possible waste, of resources. Patients who undergo liver resection are also transferred postoperatively to the ICU. However, this may not be necessary in all cases. This study was designed to assess the necessity of ICU admission.

Methods: Medical records of 313 patients who underwent liver resections, as performed by a single surgeon from March 2000 to December 2010 at Yonsei University Health System were retrospectively reviewed.

Results: Among 313 patients, 168 (53.7%) patients were treated in the ICU. 148 (88.1%) patients received only observation during the ICU care. The ICU re-admission and intensive medical treatment significantly correlated with major liver resection (odd ratio [OR], 6.481; p = 0.011), intraoperative transfusions (OR, 7.108; p = 0.016). Patients who underwent major liver resection and intraoperative transfusion, were significantly associated with needs of mechanical ventilator care, longer postoperative stays in the ICU and the hospital and the hospital mortality.

Conclusion: Most patients admitted to the ICU after major liver resection just received close monitoring. Even though patients underwent major liver resection, patients without receipt of intraoperative transfusion might send to the general ward. Duration of ICU/hospital stay, ventilator care and mortality significantly correlated with major liver resection and intraoperative transfusion. Major liver resection and receipt of intraoperative transfusions should be considered indicators for ICU admission.

FOS397

PREDICTIVE FACTORS OF MORBIDITY AND MORTALITY IN THE SURGICAL MANAGEMENT OF HYDATID CYST OF THE LIVER; RETROSPECTIVE MULTICENTRIC STUDY

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Introduction: Cystic echinococcosis is endemic in certain parts of the world, surgery remains the treatment of choice, but surgical management of hydatid cyst of the liver is still associated with high mortality and morbidity; The aim of this study is to find out possible predictors for this high mortality and morbidity.

Methods: The medical records of 426 patients who underwent surgery for hydatid cyst of the liver were retrospectively reviewed. The mortality and the morbidity rates were assessed as well as the following eight potential predictors of mortality and morbidity: age of the patients, size of the cyst, and number of cysts, other organs involved by the disease, the presence of preoperative complications, and the type of surgery performed (radical or conservative). Cross-tabulation and logistic regression between mortality and morbidity (dependent variable) and the above-mentioned eight potential predictors (independent variables) were carried out.

Results: Results of the 426 patients, 68% were female subjects and 32% male subjects, (mean = 34 years), the mortality rate was 4% (n = 4), and the overall morbidity rate was 26% (n = 112), while specific complications of liver hydatid cyst surgery were seen in 19% (n = 80). Patients of age >40 years, with a cyst diameter of >10 cm, right cyst of liver, who presented with pre-operative complications, who had

conservative surgery, were having a significantly higher mortality and morbidity rate.
Conclusion: Age, size of the cyst, the presence of preoperative complications particularly cyst-biliary communication, and type of surgical procedure performed (conservative or radical) represent as significant predictors of mortality and morbidity of surgery for liver hydatid cyst.

FOS398
AN OPEN-SOURCE WEB-BASED LIVER AUDIT DATABASE

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Introduction: Prospective data collection in liver surgery is a vital part of both clinical research and ongoing performance audit. Meaningful analysis of this data requires grouping of results according to complex criteria and the computation of multiple clinical scores. Ideally these results are available in real time, which requires that the database is readily available in different clinical settings and that the various computations and compilations are performed automatically.
Methods: A database was constructed using Microsoft SQL Server 2008 R2. The database stores the entered raw data, and automatically performs multiple compilations (e.g. stratifying according to type of surgery, major versus minor resection, anatomic versus non-anatomic resection) and computations (e.g. Childs score, MELD score, liver volume, tumour volume, Basingstoke Prognostic Index, Clinical Risk Score, overall survival, primary and secondary disease-free survival). CUSUM data for mortality, margin positivity and bleeding based on published risk factors for these outcomes are calculated automatically. A web-based front end to the database was constructed using ASP. NET MVC 3 and the Microsoft Internet Information Services web server.
Results: The web-based database is currently fully functional and in use within the unit of the presenting authors. It has been constructed using Microsoft technology to facilitate compatibility with hospital IT services. The software required to run the database on a Windows system is available as an official free download from Microsoft. It is designed to be able to run either on a stand-alone computer, on a local network, over the Internet or be hosted in the Cloud. The script to construct the database is contained within a single text file written in T-SQL, which enables the accuracy of the calculations to be independently tested and verified.
Conclusion: A comprehensive web-based liver audit database is presented. A demonstration of the database is hosted at http://www.liverdb.com. It is proposed to make the database freely available to any units that may wish to implement it at their institution, as it is recognised that a common data set would facilitate sharing of data for collaborative studies. Interested parties are invited to join a committee to continue development of this database as an open source project.

FOS399
UNPLANNED HOSPITAL READMISSIONS WITHIN 30 DAYS AFTER LIVER AND PANCREATIC RESECTIONS

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Introduction: Due to limited resources within the NHS, clinicians in the UK are under constant pressure to discharge patients rapidly, even after major surgery. There is a concern that premature discharge may lead to high readmission rates and worsen clinical outcomes. The aim of this study was to evaluate the incidence and outcome of unplanned hospital readmission after liver and pancreatic resection.
Methods: Patients who underwent liver or pancreatic resection between January and December 2010 were identified from a prospective database. Potential risk factors for unplanned readmission within 30 days of discharge from hospital were evaluated. Reasons for readmission were categorized as minor (Clavien grade 1–2) or major complications (grade 3–4), and mortality after readmission was also assessed.
Results: Median hospital stay after liver and pancreatic resections were 6 (range 4–66) and 9 days (5–225). 14/174 (8%) patients were readmitted after liver resection. The type of liver resection was associated with readmission (major 12.5% v minor 3%; $p = 0.03$). Of the readmitted patients, 7 (50%) had major complications, including 4 who had an uncomplicated index admission and 2 patients died. 10/100 (10%) patients were readmitted after pancreatic resection. Readmission was more likely in patients with pancreatic fistula (30% v 8%; $p = 0.06$) or white cell count $>15 \times 10^9$/L at the time of discharge (38% v 6%; $p = 0.003$). Of the readmitted patients, 4 (40%) had major complications, including 3 who needed urgent embolization. Two patients in this group died.
Conclusion: Hospital readmission rates after liver and pancreatic resection are acceptable. However, readmitted patients have a very high morbidity, often requiring urgent intervention only available at a specialist centre. Efficient communication and rapid transfer of patients to a centre with the available expertise is vitally important to prevent delayed deaths after major liver or pancreatic resections.

FOS400
LONG TERM RESULTS WITH MAJOR HEPATECTOMY AND BILIARY RECONSTRUCTION FOR HEPATIC ALVEOLAR ECHINOCOCCOSIS

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Introduction: Hepatic alveolar echinococcosis (HAE) is a parasitic disease due to the hepatic involvement by the larva of *Echinococcus multilocularis*. Natural history of the disease leads to pseudo-tumoral involvement of the liver and the hepatic veins and even to a metastatic disease to the lungs

and the brain. Without treatment, up to 80% of patients may die within ten years of diagnosis. Surgical treatment is still controversial especially in case of involvement of the biliary convergence.

Methods: For the last 30 years, 115 patients have undergone liver resection in our surgical unit for HAE. Among them, 28 patients had enlarged hepatectomy with biliary reconstruction due to involvement of the biliary convergence.

Results: Patient's median age was 55 years old. Main symptom was jaundice with cholangitis in 57% of the cases. Major hepatectomy with biliary reconstruction was performed in all cases (right lobectomy in 75%) and vascular reconstruction in 46% of the cases. Mortality and morbidity rates were 3.5 (1/28) and 10% respectively. There was no post operative liver failure. Median follow-up was 11 years, with a 10-years overall and disease free survivals of 82% and 78% respectively.

Conclusion: Enlarged hepatectomy with biliary reconstruction in front of biliary convergence's involvement due to hepatic alveolar echinococcosis are possible and lead to long term survival.

FOS401
MICROWAVE ABLATION FOR THE TREATMENT OF LIVER TUMORS: A SINGLE-INSTITUTION EXPERIENCE OF 92 CASES

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Introduction: When liver tumors are unresectable, microwave ablation (MWA) is an available technique used to achieve local control. Few studies have reported the efficacy of MWA for treating hepatic malignancies. We sought to examine our institutional experience using MWA to treat liver tumors, with particular emphasis on disease-free survival and prognostic factors for recurrence of metastatic disease.

Methods: A single-institution retrospective review was conducted of all patients with liver tumors treated by MWA. Patients were grouped by primary tumor type: hepatocellular carcinoma (HCC), colorectal liver metastases (CLM), metastatic carcinoid (MC), and other tumors. Survival was analyzed with Kaplan-Meier curves. Overall survival (OS) and disease-free survival (DFS) analysis included only those patients whose malignancies were completely ablated on postoperative imaging. Cox proportional hazards models assessed independent significance of prognostic variables with hazard ratios (HR) and 95% confidence intervals (CI).

Results: Eighty-one patients (43 female) underwent 92 MWA operations (72 open, 13 laparoscopic, 7 percutaneous). Ten operations were for HCC, 39 for CLM, 20 for MC, and 23 for other tumors. Median tumor size was 2 cm (range 0.9–5.5). Concomitant liver resection was performed in 56 cases (61%). Overall 90-day morbidity and mortality rates were 16% and 1%. On postoperative imaging, 84 cases (91%) demonstrated complete ablation. At a median follow up of 16 months, there were 11 local recurrences (14%). Median OS and DFS were 36 and 18 months. Use of neoadjuvant chemotherapy independently predicted earlier recurrence (HR: 2.1, CI: 1.0–4.4, $p = 0.05$). Tumor size and number of tumors ablated did not correlate with DFS ($p > 0.6$).

Conclusion: MWA can be used to treat liver tumors with an acceptably low morbidity and mortality. The efficacy of MWA to provide local control for liver malignancies may depend on preoperative factors such as the use of neoadjuvant chemotherapy, but larger comparative studies are needed to substantiate and expound upon these findings.

FOS402
EVALUATION OF THE RISK FACTORS FOR BLEEDING IN MAJOR LIVER RESECTION

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Introduction: Major liver resections are still associated with high risk of massive blood loss. Up to now the exact definition of massive blood loss is not defined. The aim was to evaluate the prognostic factors for intraoperative bleeding significant for morbidity and mortality after major liver resections.

Methods: Design – a single-center retrospective cohort study. The results of major liver resections (removing 3 or more segments) in 230 patients with solid malignant and benign liver tumors and Klatskin's tumor were evaluated. The blood loss was calculated in percentage of blood volume (BV). The complications rate was evaluated according to Dindo-Clavien. The variables were compared by the chi-square test or odds ratio (OR) and 95% confidence interval.

Results: The mean blood loss (BL) was 33% of blood volume (BV) (23; 54%). The rate of the moderate and severe complications was 43%, the mortality rate was 7.4%. BL > 30% of BV increased the risk of liver insufficiency, OR 2.54 (1.1, 5.6). BL > 40% of BV increased the major complications rate, OR 2 (1.2; 3.4). BL > 70% of BV impacted on mortality, OR 4.53 (1.5; 12.1). The significant prognostic factors for blood loss were: liver cirrhosis ($p = 0.04$); preoperative chemotherapy, OR 3.1 (1.23, 3.94); prothrombin index <45% ($p = 0.002$); tumor size >7 cm, OR 5 (2, 12); the tumor involvement >3 liver segments, OR = 2.2 (1.3, 3.9); the right lobe tumor location, OR, 2.7 (1.3, 5.8); tumor invasion into the main branches of the portal vein, OR = 4.4 (1.1, 16.8) and into inferior vena cava (IVC), OR = 6 (1.2, 29); the impairment of blood flow in IVC, right and middle hepatic veins, OR = 5.2 (1.8, 14.7).

Conclusion: Estimation of prognostic factors could help to calculate the risk of massive blood loss. It allows decreasing intraoperative bleeding, postoperative morbidity and mortality after major liver resections.

FOS403
MANAGEMENT OF SPONTANEOUS LIVER HEMORRHAGE

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Introduction: Spontaneous hemorrhage from liver tumors is an uncommon but serious complication. Recently interventional radiologic techniques are being utilized increasingly in management of these patients. We report our 16-year experience in managing spontaneous hemorrhage from liver tumors.

Methods: 26 consecutive patients were diagnosed with non-traumatic spontaneous liver hemorrhage between 1995 and 2011.

Results: Initial management was operative in 7, interventional radiology (IR) in 10 and supportive in 9. Of those managed operatively, 4 were segmentectomies, 1 hemihepatectomy, 1 wedge resection, 1 packing who later died from coagulopathy. In the IR patients, 10 underwent angiography with 7 having simultaneous angiographic embolization (AE); 2 required re-embolization; 1 underwent resection of a hepatic adenoma (HA) 21 days after AE. The malignant lesions included hepatocellular carcinoma (n = 3), angiosarcoma (AS, n = 1), metastatic squamous cell carcinoma (SCC, n = 1), metastatic leiomyosarcoma (n = 1), non-SCC (n = 1) or metastatic AS (n = 1). Benign diseases included HA (n = 6), end-stage liver disease (n = 1), or polycystic liver (n = 1). Ten were unknown.

Conclusion: Spontaneous hemorrhage from the liver occurs evenly from benign or malignant causes, 1/3 of which are primary liver disease. If the patients presents emergently, angiographic embolization may control the bleeding and allow for elective resection once the sequelae of bleeding have resolved.

FOS404
CHANGING TRENDS IN HEPATIC ARTERY ANEURYSMS – A SINGLE CENTRE EXPERIENCE

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Introduction: There have been changes, over time, in the type, cause and presentation of hepatic artery aneurysms (HAA) as well as their management. Although there are many case reports, few are from developing countries and few comparing patient outcomes after angioembolisation and surgery.

Methods: We retrospectively analysed patients admitted with HAAs between February 1999 and July 2011. We divided them into two groups, those who presented before 2007 (Surgery group) and after 2007 (Embolisation group). We studied their demographic characteristics, presentation, investigations, technical/ clinical success of treatment and in hospital mortality. Technical success was defined as non-visualisation of the pseudoaneurysm after the procedure and clinical success as cessation of further bleeding (includes absence of bleeding from same site on re-embolisation or surgery), non requirement of further blood transfusions, stable hemoglobin level and improvement of hemodynamic parameters.

Results: There were 30 patients with a median age of 42 years and 17 were males. Nine patients underwent surgery and 21 had embolisation (24 procedures). Iatrogenic causes (14; 47%) and trauma accounted for the majority (12; 40%). Only one patient had true aneurysm. The predominant symptoms were gastrointestinal bleeding (17; 57%) or abdominal pain (13; 43%). There was no mortality in the surgery group, in hospital stay was longer and transfusion requirement higher. In the embolisation group, technical success was 100% and clinical success 83%. Clinical failure (2; 67%) and complications (1; 33%) were seen in common hepatic aneurysms after embolisation. The mortality in this group was 14% (3).

Conclusion: Hepatic artery pseudoaneurysms are much commoner than true aneurysms, and occur more commonly on the right side, in an intrahepatic location. The majority are due to an iatrogenic cause or trauma. Both surgery and angioembolisation are equally effective but the latter has advantages because of the rapidity of the bleeding control, shorter hospital stay and lower transfusion requirement. Clinical failure and complications were higher when aneurysms of common hepatic were embolised.

FOS405
CONSERVATIVE SURGERY SHOULD BE THE FIRST LINE TREATEMENT FOR LIVER HYDATID CYST SURGERY: RESULTS OF COMPARATIVE RANDOMISED STUDY

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Introduction: To date, management of liver hydatid cyst (LHC) is still subject of controversy. However, surgery is the basic treatment. It can be divided into two opposite approaches radical (R) and conservative (C). The purpose of this study was to demonstrate that R surgery of LHC is not the best attitude.

Methods: A retrospective study, from January 1990 to December 2010, of 792 patients with liver hydatid cyst were treated in experienced unit in hepatobiliary surgery. Propensity-score computer matching was performed, based on 17 variables representing patients characteristics and reoperative risk factors to correct for and minimise selection bias (Hosmer-Lemeshow goodness of fit, p = 0.9). A total of

170 patients were successfully matched and consisted of 85 pairs either undergoing C or R approaches.

Results: With median follow-up of 87 months (IQR 25, 75: 45 months; 126 months) recurrence rate was equal, 3.5% in each groups C and R odds ration (OR) 1 (95% IC, 0.2 to 5.1). There were also no statistically significant differences between C surgery and R surgery in terms of operative mortality 1.2% vs 0% (p = 0.99), deep abdominal complications 11.9% vs 16.5% OR 1.46 (95% IC, 0.6 to 3.5), global postoperative complications 15.3% vs 18.8% OR 1.3 (95% IC, 0.6 to 2.9), re interventions 0% vs 3.5% (p = 0.99), median hospital stay 7 d (IQR 5 d; 1 d) vs 7 d (IQR 5 d; 1 d) (p = 0.22).

Conclusion: Radical surgical resection does not prevent recurrences of LHC when compared to conservative approaches. As benign disease, we suggest that conservative approaches should be the preferred treatment especially in endemic countries. Radical surgery may keep some indications in specific cases and selected patients.

FOS406
SURGICAL PROCEDURES IN ADULT EXTRA-HEPATIC PORTAL VEIN OBSTRUCTION

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Introduction: Extrahepatic portal vein obstruction (EHPVO) is a relatively uncommon cause of portal hypertension in the adult population. Unlike portal hypertension for cirrhosis where surgery has almost become obsolete, many patients with EHPVO end up requiring surgical interventions for varied clinical issues related to the venous obstruction. We present our experience as regards surgical interventions in adult patients with EHPVO.

Methods: We analyzed a prospectively maintained database of 121 adult patients of EHPVO maintained by one of the authors (DA) from 1995 to 2011. We studied the 26 patients who underwent surgical procedures for various conditions resulting due to the EHPVO. We analyzed their demographic data, type of surgery, indications, immediate and late post operative complications and outcomes of these patients. Of the 121 patients with EHPVO, 26 (21%) adult patients required surgery. The age group ranged from 16 to 53 years (mean age 23 years), 16 male and 10 female.

Results: Surgical interventions were splenectomy with proximal splenorenal shunt (11), DSRS (1), splenectomy with devascularization (4), splenectomy alone (4), devascularization (2), side-side mesocavalshunt (1), small bowel resection (3). Of 19 patients who had shunt/devascularization surgery, 14 were for bleed, 5 were for hypersplenism. Of those who had splenectomy alone, 2 were for splenic abscess. Of the devascularizations, 2 patients had failure of earlier shunt surgery. Small bowel resection was performed in 2 patients for ischemic strictures and 1 gangrene.

Post operatively, 1 patient had thrombosis of the shunt on day 3. There were no mortalities. Long term, 4 patients had a blocked shunt, 5 patients had varices requiring banding. No encephalopathy.

Conclusion: Adult EHPVO is an uncommon condition and often requires a surgical intervention. Appropriate selection of the procedure can yield gratifying results in these patients. Shunt and devascularization surgery are yet in vogue for select patients.

FOS407
OUTCOMES OF LIVER RESECTION FOR HEPATOCELLULAR ADENOMA AND FOCAL NODULAR HYPERPLASIA; RESULTS OF A PROSPECTIVE TRIAL

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Introduction: HCA and FNH are rare, benign liver lesions of which diagnosis and management generate confusion. Resection for HCA > 5 cm is recommended because of risk of bleeding and malignant transformation, whereas FNH is only resected because of symptoms. The aim of the study was to prospectively assess the outcomes of resection of hepatocellular adenoma (HCA) or focal nodular hyperplasia (FNH).

Methods: Between January2008 and July2011, 111 consecutive patients with suspicion on FNH or HCA > 2 cm based on imaging studies were included. All patients underwent pre-operative Gd-EOB-DTPA magnetic resonance (MR) imaging. Liver resections were classified as major: >3 segments, or minor: <3 segments, including laparoscopic and local excisions. Histological diagnosis was used as standard of reference. Abdominal symptoms, postoperative morbidity (Dindo/Clavien classification), mortality, and relief of symptoms were scored.

Results: 111 patients (4 m; 107 f; mean age 38 yr) were included. Preoperative diagnoses based on MR imaging: HCA (44), FNH (59), HCA + FNH (4), and other (4). 46 patients were selected for resection because of HCA > 5 cm (29), symptomatic FNH (2) or strong wish of the patient (15). Mean lesion size was 7.9 cm (SD 2.5). 28/46 patients presented with complaints. Types of resection included 36 (78%) minor (9 laparoscopic resections), 10 major resections. Postoperative complications were: Grade I: 7, Grade II: 4, Grade IIIa: 2, Grade IIIb: 1, Grade IVa: 1, no mortality. Preoperative diagnosis was confirmed in 28/29 patients with HCA (1 hemangioma), and 15/15 patients with FNH. 26/28 patients showed improved complaint scores 3 months postoperatively.

Conclusion: Patients with suspicion on HCA or FNH were accurately diagnosed and selected for resection on the basis of MR imaging and symptoms. Most lesions (78%) required minor resection with relief of complaints in most patients (90%) with symptoms.

FOS408

GAMMA-GLUTAMYLTRANSPEPTIDASE-SPECIFIC FLUORESCENT PROBE FOR THE REAL-TIME IDENTIFICATION OF LIVER CANCERS

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Introduction: It has been reported that gamma-glutamyltranspeptidase (GGT), which is an enzyme of cell surface, is overexpressed in human cancer tissues. The aim of this study was to evaluate the ability of a novel fluorescent probe (gGlu-HMRG) to visualize liver cancer tissues on cut surfaces of resected specimens.

Methods: gGlu-HMRG was sprayed on the cut surface of surgical specimens of 43 hepatocellular carcinomas (HCC), 6 intrahepatic cholangiocarcinomas (ICC), and 35 colorectal liver metastases (CRLM). Gross appearance of the fluorescence and fluorescent intensities of cancerous tissues and non-cancerous tissues were evaluated.

Results: Fluorescence of gGlu-HMRG was grossly identifiable in 20 nodules of HCC (47%), 6 nodules of ICC (100%), and 34 nodules of CRLM (97%), from 5 minutes after spraying gGlu-HMRG. Among 29 nodules of HCC with quantitative analysis, fluorescent intensity was significantly higher in 8 nodules with gross identification of the fluorescence than remaining 21 nodules without gross identification (1.549 vs. 0.062, $P < 0.001$). Immunohistostaining of GGT revealed that the proportion of nodules positive for GGT was higher in HCCs with gross identification of the fluorescence (4 out of 5) than grossly unidentifiable HCCs (1 out of 7).

Conclusion: gGlu-HMRG enabled real-time identification of HCC and adenocarcinoma of the liver. Since fluorescence of gGlu-HMRG is visible to the naked eyes, fluorescent imaging technique using this probe may be useful to identify liver cancers during hepatectomy and cancerous tissues remaining on the raw surface of the liver after resection.

FOS409

MAJOR LIVER RESECTION FOR PATIENTS WITH LIVER TRAUMA

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Introduction: The liver is the second most commonly injured organ in abdominal trauma, but liver damage is the most common cause of death after abdominal injury. In spite of there has been a paradigm shift in the management of patients who have stable hemodynamic with marked change toward a more conservative approach in the treatment of abdominal trauma has been noted during the last decades, urgent surgery continues to be the standard for hemodynamically compromised patients with hepatic trauma.

Methods: this study included sixty five patients referred to the National Liver Institute (NLI), university of Menoufiya as a tertiary center during the last five years. The management option was based on hemodynamic status, radiological (ultrasound and CT) staging criteria.

Results: The age of 65 patients ranged from 4–38 years Twenty seven (41.5%) patients were not previously explored and 5 (7.6%) were explored in NLI due to biliary peritonitis. Thirty eight (58.5%) were referred after primary exploration. Fourteen (21.5%) were managed conservatively and only 5 (7.6%) were opened for removal of packs after 48 hours. Twenty four (36.9%) were reexplored due to hemodynamic instability and CT criteria, 4 (6.1%) were managed by conservative surgery (repair of lacerations). Twenty (30.7%) patients needed major liver resection, 3 (4.6%) patients by left lateral segmentectomy, 2 (3%) patients by right posterior sector resection, and 15 (23%) patients underwent right hepatectomy with one mortality, one PVT, biliary complications.

Conclusion: hemodynamic stable patients can be managed safely non-operatively, while urgent surgery continues to be the standard for hemodynamic compromised patients with hepatic trauma. NOP management doesn't lead to longer hospital stay. Low grade injuries can be managed non-operatively with excellent results.

FOS410

211 CASES OF GENERAL SURGERIES UNDER DA VINCI SYSTEM IN A SINGLE INSTITUTE IN CHINA

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Introduction: To summarize the clinical experience of 211 general surgeries under da Vinci S system.

Methods: From January 2009 to August 2011, 211 patients with hepato-pancreatico-biliary (HPB) and gastrointestinal disease underwent robotic surgeries by using da Vinci S system. The clinical data of 211 patients were analyzed.

Results: 202 patients had undergone total robotic surgeries. 9 patients converted to hand-assisted procedure and the conversion rate was 4.2% (9/211). 85 cases of bile duct surgery, including 45 cases of hilar cholangiocarcinoma, bile duct carcinoma in the middle in 1 case, bile duct carcinoma under section in 2 cases, gallbladder in 13 cases, complex intrahepatic bile duct in 18 cases and iatrogenic biliary injury in 6 cases; Pancreatic surgery in 48 patients, including pancreticoduedenectomy, 19 cases of pancreatic resection of the body, the 7 cases in the middle, and pancreatic resection in 1, and pancreatic pseudocyst in 1 and palliative surgery in 20 cases; Hepatic surgery in 22; Gastrointestinal surgery in 13 cases; Other procedures, including 45 cases bravery manager stone arts, a probe take retroperitoneal lymph node dissection and spleen resection and etc. 13 cases of obstructive suppurative cholangitis patients were all performed under the robotic system in the emergency operation. The postoperative infection symptoms were controlled and the shock was soon rectified, no perioperative deaths. 13 cases occurred postoperative complications, the overall complica-

tion rate was 6.2% (13/211); 2 patients died, and mortality was 0.9% (2/211). There were no device-related complications. Recovery was accelerated and blood loss was less.

Conclusion: Almost all operations in hepatobiliary pancreatic surgery could be performed successfully with da Vinci S system. Robotic surgery will improve the development of minimally invasive surgery.

FOS411
EFFECT OF MAJOR HEPATECTOMY IN RATS ON TUMORAL GROWTH IN THE REMNANT LIVER

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Introduction: Portal vein occlusion modifies the natural history of macroscopic colorectal liver metastases (CLM) by inducing their growth (Pamecha, Br J Cancer 2009). The effect of an hepatectomy on growth of macroscopic CLM in the remnant liver was poorly studied. Aim of this experimental study in rats was to assess, comparatively to a laparotomy (LAP), the growth of macroscopic CLM in the remnant liver after a major (H70%) hepatectomy.

Methods: Bilobar macroscopic bilobar CLM were obtained at day 7 after a portal injection of a suspension of 15.10^6 colorectal malignant cells (DHDK12) in 26 males rats (BD-IX) (Mean age: 6 weeks; Mean weight: 170 g). At this date, 25 rats underwent an H70% (n = 13) or a LAP (n = 12). Two weeks later, at sacrifice, a morphometric analysis (weight of rats and liver) and a numerical analysis (by calculating on numeric picture with Adobe Photoshop the ratio of the CLM on heathly liver of embedded specimen) were performed.

Results: Post-operative mortality was nil. At morphometric analysis (H70% vs LAP), body weights of rat were similar ($p = 0.6$), and liver weights were of 9.1 g ± 0.9 versus12.6 g ± 2.8 respectively ($p = 0.0004$). At numerical analysis, the ratio of CLM on heathly liver was estimated at 9.4% ± 5.4 in the group H70% vs 20% ± 8.8 in group LAP ($p = 0.0014$), indicating a lower growth of CLM after major hepatectomy than after laparotomy.

Conclusion: Contrary to portal vein occlusion, a major hepatectomy decreases the growth of macroscopic CLM in the remnant liver as compared to a laparotomy. This experimental data must be confirmed in patients that required two-steps hepatectomy in bilobar CLM.

FOS412
DEEP SEGMENTS ARE MORE RISKY THAN PERIPHERAL SEGMENTS FOR MINOR LIVER RESECTION: ANALYSIS ON 2012 LIVER RESECTIONS

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Introduction: Our aim was to evaluate the risk of minor liver resection in the deep posterior (DP) and superficial peripheral (SP) liver segments.

Methods: From January 2000 to December 2009, 2012 consecutive liver resections were studied from a unicentric prospectively maintained database. Resections including <1 segment (n = 439) or associated with procedures (n = 367; biliary, vascular or extrahepatic) were excluded. Patients were classified in two groups and include 104 resections in the deep posterior segments (I, VII, VIII) and 560 resections in the superficial peripheral segments (II, III, IV, V and VI, including left hepatectomy). ASA score was similar between groups. Ninety days mortality, major morbidity (Clavien > III), liver specific complications and the hospital stay were studied.

Results: There were older patients (59 vs 54, $p = 0.003$), more male (68% vs 55%; $p = 0.013$), more malignancy (87% vs 65%, $p < 0.001$) in the DP group but similar rate of cirrhosis (30.8% vs 22.7%, $p = 0.10$). DP vs SP showed higher mortality (5.8% vs 1.4%; $p = 0.005$), morbidity (30.8% vs 14.8%, $p < 0.001$), more transfusion (22.1% vs 12.7%, $p = 0.011$) and bleeding (20% vs 10.5%, $p = 0.007$). There were more pulmonary complications (25% vs 13.2%, $p = 0.02$), bile leakage (11.5% vs 6.1%; $p = 0.04$), ascitis (18.3% vs 9.6%; $p = 0.01$), drained pleural effusion (4% vs 1.3%, $p = 0.05$), relaparotomy (6.7% vs 2.5%; $p = 0.024$), liver insufficiency (1.9% vs 0%, $p = 0.001$) and more drained collections (10.6% vs 5.9%, $p = 0.078$). The mean hospital stay was longer (12.3 vs 10.29, $p = 0.026$).

Conclusion: Minor resections of the posterior segments are more risky than minor superficial peripheral segments and should be classified among major and not minor resections groups.

FOS413
MANAGEMENT OF GRADE III-IV (AAOST-OIS) BLUNT LIVER TRAUMAS: A COMPARISON STUDY WITH AND WITHOUT ANGIOGRAPHIC EMBOLIZATION

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Introduction: Liver lesions consequent to open or close abdominal trauma are a life threatening situation and their management, thanks to the extensive use of interventional radiology, progressively changed during last 30 years. Treatment choice is affected by associated lesions, but gold standard is avoiding any surgical procedure.

Methods: We review our experience in the treatment of adult blunt liver traumas in attempt to assess the impact of angiographic embolization in expanding indications for conservative treatment of grade III-IV liver injuries comparing two time windows 1993 to 2005, and 2005 to 2010.

Results: Seventy patients, with grade III-VI liver lesion, admitted to the hospital ward between January 1993 and June 2010 were recruited; those with Grade III-IV (AAST-Grading system) lesions (n 50) were selected for our study.

They were predominantly male, had a median age of 29 years (range: 16 to 91), and majority of them were hemodynamic stable (75% = 38/50)). The trauma was more frequently as a result of a road accident (78% = 39/50); type III lesions were more frequent than type IV (64% vs 36%); most of the patients had grade III hemoperitoneum (70% = 35/50) and the percentage of those non operatively treated was 62% (= 31/50).

At multivariable analysis patients treated before 2005 were more likely to be older than 39 years (OR = 8.75; CI: 2.)

Conclusion: Indications for conservative treatment of liver traumas cannot be solely based on to the relief of hemodynamic stability. The new multi-slice high-speed CT scanners are very sensitive and assist in ruling out associated intra-abdominal injuries, and allow one to quantify the presence of blood in the peritoneal cavity and especially to identify those patients in whom conservative treatment might fail due to hepatic arterial hemorrhage that could be stopped by angiographic embolization.

FOS414
CLINICAL COURSE OF RUPTURE TO A LIVER HYDATID CYST IN TO PERITONEAL CAVITY. ANALYSIS OF PROGNOSTIC FACTOR IN A COHORT OF PATIENTS

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Introduction: The hydatid disease is endemic in some regions of Asia, Mediterranean and South America. The liver is the primary site of localization in human and the rupture of liver hydatid cyst to peritoneal cavity is infrequent and poor prognosis complication of this disease. Our aim is to present the results of a cohort patients operated for a rupture of liver hydatid cyst to peritoneal cavity and analysed some prognostic factor for peritoneal recurrence.

Methods: A historical cohort study was conduced in 2 Universitary Hospital from Chile between January 2000 to December 2010. All patients with a rupture of liver hydatid cyst operated was included. Clinical variables was measured: biodemograhics, liver hydatid disease history and surgery, abdominal trauma history, cystobiliar communication, hydatid cyst characteristics, hydatid cyst size. The results variables measured: type of surgery, morbidity, inhospital mortality, peritoneal recurrence. The statistical analysis was done with use of descriptive and analytical statistics in software Stata 10.0.

Results: Twenty nine patients are the cohort. The median age was 40.7 ± 21.6 (12–82) years and 69% male. The 65.5% don't have hydatid disease history. A 19.9% have history of abdominal blunt trauma. The 69% was localized in right hepatic lobe. The 37.9% have between 10–15 cms. size. The 48.8% have a cystobiliary communication. The 72.4% was a multivesicular cyst. The 44.8% was a subtotal cystectomy. A 48% have a sometype morbidity. In a 13.8% received albendazole in a postoperative period. Five patients (17.25%) have a diffuse peritoneal recurrence during a 12 months median follow-up. The variables measured: size, cystobiliary communication and hydatid cyst characteristics didn't associate with peritoneal recurrence.

Conclusion: The peritoneal rupture of liver hydatid cyst is associated with a high rate morbidity and high rate of peritoneal recurrence. We don't found an association between size, cystobiliary communication and hydatid cyst characteristics with more probability of peritoneal recurrence.

FOS415
THE PLACE OF THE "DA VINCI" ROBOTIC SURGICAL COMPLEX IN PANCREATIC AND LIVER SURGERY

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Introduction: Nowadays the robotic technics actively penetrates in routine surgical practice. While developing this direction the great advantages of robotic operations in comparison with both traditional and laparoscopic ones were found.

Methods: Since 2009 in abdominal department of Surgery Institution named by Vishnevsky 79 robot-assisted operations were provided. There is a quite broad range of the interventions: 37 liver resections, 8 pancreatic resections, 1 pancreato-duodenic resection, 33 operations on the other abdominal and extra abdominal organs.

The pathology selection for robot-assisted surgery directly depended on the experience of laparoscopic treatment of this pathology.

The preoperational procedure included computer modeling of the coming surgery. The patients underwent computer tomography followed by the 3D reconstruction.

Results: The ideal points of application of robototechnics in liver surgery are so-called posterior liver segments (VII, VIII). In this particular hard-to-reach for traditional laparoscopic technics segments the robot-assisted atypical resections are approved.

As far as pancreas is concerned the most advanced robotic interventions could be the distal resections (especially in case of saving the organ) and median pancreas resection.

Due to the great manipulation advantages of the robotic instruments and the 3D image opportunities the interventions on these areas can be carried out more precisely and safely in comparison with traditional laparoscopic technic.

There were no complications noted in the early post operation period.

Conclusion: Operating with the help of the robotic complex allows high quality volumetric vision, precise mobilization, decrease of the intra operational injury and blood loss. It also provides comfortable position of the surgeon in the course of the complicated pancreatic and liver interventions.

FOS416

REVERSIBLE PORTAL VEIN EMBOLIZATION INDUCES LIVER REGENERATION DESPITE RECANALIZATION

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Introduction: Preoperative permanent portal vein embolization (PVE) is widely used before major hepatectomy to induce hypertrophy of the remnant liver. Reversible PVE with absorbable agents would be safer in clinical situations where the embolized liver is not resected. Study aims: (1) To determine the recanalization time course following reversible PVE; (2) to confirm the efficacy of reversible PVE on hypertrophy of the non-embolized liver lobes; (3) to observe the impact of reversible PVE on embolized lobes.

Methods: Thirty BL6/male mice underwent 70% PVE using powdered absorbable material. Repeated portographies and angiographic MRI were carried out until complete recanalization of the embolized lobes. Liver regeneration was assessed by immunohistochemistry (BrdU, Ki-67, Ph-Histone 3 stainings). Liver lobe volumes were determined by small animal MRI volumetry.

Results: Proximal and complete recanalization of the embolized portal tributaries occurred 10 and 14 days after PVE, respectively. The hypertrophy ratio of the non-embolized lobes was 52 ± 5.9% at day 10 (i.e. 67% of total liver volume) and 75 ± 19% at day 14 (i.e. 63% of total liver volume). The atrophy ratio of the embolized lobes was 55 ± 1.4% at day 10 (i.e. 33% of total liver volume) and 33 ± 11% at day 14 (i.e. 37% of total liver volume). Reversible PVE induced significant hepatocyte proliferation in the non-embolized lobes.

Conclusion: Despite recanalization of portal tributaries, reversible PVE efficiently induces liver regeneration and volume hypertrophy in the non-embolized lobes. The next step will be to assess the functional and morphological recovery of the embolized liver lobes after recanalization.

FOS417

100 LAPAROSCOPIC LIVER RESECTIONS IN A SINGLE CENTER: UNDERLYING LIVER DESASE (ULD) VS. NO UNDERLYING LIVER DISEASE (NULD)

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Introduction: The advantages of the laparoscopic approach in abdominal surgery have been shown in various abdominal procedures. Laparoscopic Liver Resection (LLR) has recently been developed and could reduce postoperative morbidity. The aim of this study was to evaluate retrospectively our results of LLR in underlying liver disease (ULD) patients and no underlying liver disease patients (NULD).

Methods: Between 2004 January and 2011 November 100 consecutive laparoscopic hepatic resections were performed in our center. Surgical results and postoperative course were evaluated in two groups according to the ULD/NULD. The criteria for patient's selection were not modified by the use of laparoscopy. ULD was present in 38/100 (38%) patients and NULD in 62/100 (62%). Median (IQR) age and sex was respectively 64 years old (54–73), (22 m: 9 f) and 53 years old (44–62), (22 m: 40 f). In the ULD group, indication for liver resection was: HCC 36 (95%), Cholangiocarcinoma 1 (2.5%), benign pathology 1 (2.5%); in NULD: MENCR 20 (32.3%), benign pathology 20 (32.3%), MECCR 17 (27.4%) and cholangiocarcinoma 4 (6.5%).

Results: The type of resection was respectively: wedge resection (28 vs. 41) (73.7% vs. 66.1%), left lobectomy (9 vs. 16) (23.7% vs. 25.8%), right hepatectomy (0 vs. 2) (0 vs. 3.2%) and left hepatectomy (1 vs. 3) (2.6% vs. 4.8%). Median operating time was: 120 minutes (110–80) vs. 140 (75–180) (p: 0.970). Median blood loss (ml) was: 100 (38–200) vs. 50 (10–100) (p: 0.004). Blood transfusion was required in 1 patient in ULD group (2.6%, p: 0.004). Conversion to laparotomy occurred in 3 patients (7.9%) in ULD group and in 1 patient (1.6%) in NULD to achieve an adequate hemostasis (p: 0.152). Morbidity rate was 2.9% in ULD group and 6.9% in NULD. Median hospital stay (IQR) was 6 (4–7) vs. 5 (3–7) days (p: 0.098).

Conclusion: Left lobectomy and wedge resection of the anterior hepatic segments remain the gold standard for LLR, but major hepatectomies are feasible in "experienced hands". In our experience no significantly different results were reported for LLR in ULD vs. NULD patients. However, the median blood loss is greater in ULD group even if minor resections are associated. In conclusion LLR is a feasible and safe procedure in ULD/ NULD selected patients.

FOS418

IS LAPAROSCOPIC LIVER SURGERY COST-EFFECTIVE FOR BOTH MINOR AND MAJOR HEPATECTOMY?

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Introduction: Laparoscopic liver surgery is progressively gaining popularity. However, it is still unclear whether the laparoscopic approach is cost-effective for both minor and major hepatectomy compared to the open approach. In this study we analysed the cost-effectiveness of the laparoscopic approach for standardized minor hepatectomy, as left lateral sectionectomy, and major hepatectomy, as right hemi-hepatectomy.

Methods: A retrospective clinical and cost comparison analysis for patients undergoing laparoscopic right hepatectomy (LRH) and laparoscopic left lateral sectionectomy (LLLS) versus the open counterparts (ORH and OLLS) was performed. Data considered for the comparison analysis were: operative costs (surgical procedure, operative time, blood transfusions), postoperative costs (hospital stay, complication management, readmissions) and overall costs.

Results: A total of 149 patients were included: 38 patients underwent LRH and 46 ORH; 46 patients underwent LLLS and 19 OLLS. For LRH the average operative, postoperative and overall costs were: £10181, £4037 and £14218; for ORH the average operative, postoperative and overall costs were: £6483 ($p < 0.0001$), £10304 ($p \leq 0.0001$), and £16787 ($p = 0.886$, Mann-Whitney test). Regarding LLLS, the average operative, postoperative and overall costs were: £5460, £2587, and £8047; for OLLS the average operative, postoperative and overall costs were: £5841 ($p = 0.873$), £5687 ($p < 0.0001$), and £11528 ($p = 0.0001$, Mann-Whitney test).
Conclusion: Our data support the cost-effectiveness of laparoscopic left lateral sectionectomy and the cost-neutrality of laparoscopic right hepatectomy compared to the open approach. The benefits of the minimally-invasive approach can be extended to major hepatectomy without cost disadvantage.

FOS419
COMPARISON OF LAPAROSCOPIC AND ROBOTIC LIVER RESECTION

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Introduction: The minimal invasive surgical procedures have developed more and more in the field of HBP surgery. One of them, a robotic surgery can be applicable to the liver resection. Here, the author report the comparison of laparoscopic (LLR) and robotic liver resection (RLR).
Methods: Between May 2010 and June 2011, there were 13 robotic hepatectomies including 10 left lateral sectionectomies and 3 left hepatectomies and 17 laparoscopic hepatectomies including 11 left hepatectomies and 6 left lateral sectionectomies. The left hepatectomy and left lateral sectionectomy in laparoscopic liver resection were selected to compare with robotic liver resection under same condition. On the other hand, 177 laparoscopic hepatectomies were performed from July 2007 to June 2011. The da Vinci® Robotic Surgical System (Intuitive Surgical, Sunnyvale, CA) was used with 4 robotic arms during liver resection.
Results: There were no significant differences in preoperative characteristics between the two groups. The mean operative time (240.9 ± 68.6 vs. 291.5 ± 85.1 mins; $p = 0.082$) and blood loss (342.6 ± 84.7 vs. 388.5 ± 65.0 ml; $p = 0.114$) were similar between the LLR group and the RLR group. There were no significant differences in postoperative characteristics except the mean medical cost ($7{,}628{,}639 \pm 1{,}620{,}475$ vs. $12{,}943{,}898 \pm 2{,}452{,}476$ won; $p = 0.001$) between the LLR and RLR groups.
Conclusion: The robotic surgical system has sophisticated advantages such as 3-dimensional image that provides a advanced vision for surgeon and 360° rotating endowrist that is very comfortable for suture. RLR seems to be a safe and feasible procedure in selected patients, which is same with LLR. However, RLR needs to have a liver transaction tool such as CUSA and the retrenchment of medical cost in the near future.

FOS420
LAPAROSCOPIC HEMI-HEPATECTOMY: A CONSIDERATION FOR ACCEPTANCE AS STANDARD OF CARE

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Introduction: Since the inception of laparoscopic liver resection, the left lateral resection has become standard of care for lesions located in segment II and III. However, few centers have evaluated hemi-hepatectomy as standard of care. This study evaluates the potential for laparoscopic left hemi-hepatectomy to be evaluated as standard of care.
Methods: An international database of 1620 laparoscopic liver resections was established and patient outcomes were analyzed using univariate, and multivariate analysis.
Results: 222 laparoscopic left lateral sectionectomy (L lat) and 82 laparoscopic left hemi-hepatecomy (LH) were performed. The L Lat group compared to LH group had diagnosed a higher rate of cirrhosis (27% vs. 21%; $P = 0.003$) and cancer (48% vs. 35% $P = 0.04$). Tumours in the LH group were larger than those removed in Llat group (7.09 vs. 4.89 cm; $P = 0.0006$) The mean operating time for LH was longer than Llat (3.9 vs. 2.9 hours; $P < 0.0001$, as well as whereas blood loss was higher in the LH group (306 vs. 198 $P = 0.003$). Morbidity (24% vs. 12%; $P = 0.008$) and length of hospital stay (7.1 vs. 2.5 days; $P \leq 0.0001$) higher in the Lh group than Llat group. Mortality and recurrence did not differ between the 2 groups.
Conclusion: Laparoscopic L lat should be considered as a standard of care as confirmed by the analysis of this multicentric database. Laparoscopic LH is a more complex and time consuming procedure than L lat but has the potential to be investigated in comparative prospective studies as a new standard of care. Intra-operative d blood loss, complications and conversions are more than acceptable in experts hands. Postoperative morbidity and mortality rates together with safe surgical margins.

FOS421

LAPAROSCOPIC HEPATECTOMY FOR BENIGN TUMOUR, LOCALIZATION IS NOT A LIMITED FACTOR

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Introduction: Laparoscopic hepatectomy (LH) is a growing surgical operation with over 3000 published cases. Amongst those 3000 LH, 44.7% have been performed on benign tumors. The laparoscopic approach is appropriate when dealing with this indication, but it has limitations regarding the size and localization of tumors. The aims of this study are to give an account of the surgical results of the LH performed at our centre and to verify the choice of this method as a prime approach regardless of the localization of lesions.

Methods: Retrospective analysis and prospective data gathering examining the surgical results of laparoscopic hepatectomies of benign hepatic tumors carried out at the University Hospital of BORDEAUX. The patients were all histologically diagnosed with benign hepatic tumor. The Focal Nodular Hyperplasia, the hepatic hemangioma and the hepatic cysts were all symptomatic in pre-operative. Their localization and size were taken into account in pre-operative but were not a limiting factor to the laparoscopic approach. Two groups are compared according to localization of tumor. The patients who had an inferior or anterior hepatic tumor (group I) are compared to the patients with difficult localization (posterior and superior; group II).

Results: Between January 2000 and December 2008, 94 patients received Laparoscopic Hepatectomies. Sixty four patients have had a benign tumor. Forty seven patients had an easy localization and seventeen had a difficult localization. The operating time was similar into the two groups (median group I 150 minutes, groups II 150 minutes, p 0.953). The blood lost was similar into the groups (median, group I 100 ml, group II 100 ml, p 0.800). There was one complication into the group II and one laparotomy conversion (2 complications in the group I, p 1.000). In multivariable analysis the tumor localization was not an independent risk factor of morbidity.

Conclusion: LH is a reliable operation and should become the technique of choice when dealing with benign hepatic lesions of surgical order. Their localization should not be contra-indicative to laparoscopy.

FOS422

CLINICAL FEATURES AND MANAGEMENT OF HEPATIC CYSTADENOMAS AND CYSTADENOCARCINOMAS

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Introduction: Liver cystadenomas and cystadenocarcinomas comprise approximately 5% of hepatic cysts. Neoplastic cysts are often incorrectly diagnosed and incompletely managed. The objective of this work was to describe a single tertiary care center's experience with these lesions over 15 years.

Methods: A retrospective chart review was carried out. Consecutive patients undergoing surgery for liver cystadenomas or cystadenocarcinomas from 1997–2011 were included. Clinical, operative, postoperative, and pathological data were collected and summarized.

Results: A total of 13 patients with cysts 6–18 cm were identified. Most were females (92%). The commonest presenting symptom was abdominal discomfort (62%). Most cysts were located in the left lobe/centrally (77%) and had septations (62%). Mural nodularity was infrequent (23%). Nine patients had liver resection/enucleation, while 4 had unroofing/fenestration. In 3 patients with unroofing, a frozen section was falsely negative. Pathology showed mucinous cystadenoma in 11 patients. Two patients had foci of cystadenocarcinoma within mural nodules. There was no 90-day mortality. All but one patient (myocardial infarction) were alive at a median follow-up of 10 months (1–158). Two patients with cystadenomas developed recurrence after unroofing.

Conclusion: Hepatic cystadenomas were most commonly found in women, with a predilection for the left lobe or central liver. Malignant transformation was identified in 15% and was associated with nodularity. Enucleation or formal resection is indicated to avoid cyst recurrence. Intraoperative frozen section analysis was ineffective at ruling out cystadenomas.

FOS423

EUROPEAN EXPERIENCE FOR LAPAROSCOPIC MAJOR HEPATECTOMY

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Introduction: Laparoscopic liver resections have seen an important proliferation worldwide, but this regards mostly minor hepatectomies. Major anatomic resections were initially considered unsuitable for a minimally invasive approach. Nowadays, major hepatectomies are still confined to few expert centers worldwide. Our aim is to report the experience of European expert centers and discuss the current trends in the application of laparoscopy in major hepatectomies with the different techniques and approaches.

Methods: The prospective databases of 4 French, 2 Italian, 1 English, 1 Dutch, 1 Spanish and 1 Norwegian centers were combined to provide answers to a questionnaire that had been addressed to all European centers known to perform laparoscopic liver surgery. Between 1996 and 2011 a total of 389 laparoscopic major liver resections were performed: right and left hepatectomies in their vast majority. The selection criteria, indications and important technical points are discussed.

Results: Major liver resections represented 19.4% of all laparoscopic hepatectomies. 5% to 31% of right and left hepatectomies were performed by laparoscopy. Benign, primary malignant and metastatic lesions were respectively 25.6%, 18.1% and 56.3% of all indications. Hand assistance was selectively used in 9 centers and systematically in one. Portal triad clamping was applied routinely in 2 centers and inflow was controlled extraparenchymally by 9 groups. Different approaches were found regarding liver mobilization and hepatic vein control prior to parenchyma transection. Overall conversion rate was 14%. Operative times for right and left hepatectomies were 319 min and 268 min, respectively, while blood loss was 409 ml and 278 ml, respectively.

Conclusion: To date, an important experience has been accumulated in Europe for laparoscopic liver resections and experience for major hepatectomies is constantly increasing with more centers being involved. Whatsoever, they still remain technically very demanding procedures that should be confined to expert surgeons having already acquired considerable experience with simpler laparoscopic liver resections.

FOS424

CAUSES, PREDICTIVE FACTORS AND MANAGEMENT OF CONVERSIONS IN 223 CONSECUTIVE LAPAROSCOPIC LIVER RESECTIONS

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Introduction: As a consequence of continuous technical developments in liver surgery, laparoscopic liver resection (LLR) is increasingly performed worldwide, especially for malignancies. We report herein a single institution 7-year experience in LLR, focusing on causes of conversion, technical issues and outcomes.

Methods: Between January 2004 and December 2010, 223 LLR were performed in 200 patients for benign, live donation, primary and metastatic liver disease. Repeat LLR and two-stage hepatectomy were performed in 19 (8.5%) and 3 (1.3%) cases, respectively. Simultaneous resection of colorectal primary cancer and synchronous liver metastases was done in 6 (2.7%) patients.

Results: Overall conversion rate was 17/223 (7.6%), mainly due to bleeding episodes (52.9%). Conversions were equally distributed over time and statistically significant factors for conversion were found to be LLR of P-S segments in the converted vs. the non-converted group (14.5% vs. 4.1%, $p = 0.012$ respectively) and major vs. minor hepatectomy (17.5% vs. 5.5%, $p = 0.017$). In malignancy, R0 resection was obtained in 91% of cases. Complication rates were scored as: n = 15 grade I; n = 9 grade II; n = 7 grade III and n = 1 grade IV. Multivariate analysis revealed resections involving P-S segments as an independent risk factor for conversion ($p = 0.036$, OR = 3.2, CI = 1.1–9.4).

Conclusion: LLR can be safely performed accounting for low overall morbidity and a favourable outcome. LLR in P-S segments most likely lead to conversion to open approach irrespective from the learning curve, needing careful intraoperative management.

FOS425

LAPAROSCOPIC ASSISTED MAJOR LIVER RESECTION

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Introduction: The number of reports of laparoscopic major hepatectomies has gradually been increasing and living donor hepatectomies for liver transplant have also recently been performed. However, because of the high degree of proficiency required, major hepatectomies have not been

widespread. We have developed an original procedure in which the liver is mobilized laparoscopically and resected by a hanging technique through a small incision.

Methods: Between November 2002 and December 2010, 75 patients underwent laparoscopy-assisted major liver resections (LAMLRs) in our institution for hepatocellular carcinoma (HCC), metastatic liver cancer, benign diseases, and living donor. LAMLRs were completed for 74 patients (98.7%). The median age of was 57 years (range: 20–83 years). Preoperative diagnoses were malignant diseases (n = 42), benign disease (n = 8), and living donor (n = 24). The types of liver resection consisted of the following: right trisectionectomy (n = 2), right hepatectomy (n = 34), left hepatectomy (n = 22), trisegmentectomy 4, 5, 8 (n = 3), right anterior sectionectomy (n = 5), and right posterior sectionectomy (n = 8).

Results: The median operating time was 355 minutes (range: 192–542 minutes), and median blood loss was 416 ml (range: 52–2785 ml). Eight patients (10.8%) experienced postoperative complications, 4 patients (5.4%) showed bile leakage, and 4 patients (5.4%) developed wound infections. The median postoperative hospital stay was 10 days (range: 6–154 days).

Conclusion: LAMLR with the hanging technique can be completed safely. The procedure can be performed by open liver surgeons; and thus may be widely performed in the future.

FOS426
A SUSCEPTIBILITY MODEL FOR VENOUS THROMBOEMBOLISM AFTER MAJOR HEPATIC RESECTION

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Introduction: Despite an international normalized ratio that is frequently elevated, patients with advanced chronic liver disease were recently found to have an elevated risk of venous thromboembolism (VTE). With the decision to prophylax against VTE frequently predicated on assessment of individualized patient risk, the aim of this study was to develop a predictive model to assess the risk of VTE after major hepatic resection (MHR).

Methods: For the multivariate regression model, variables at a significance level of $p < 0.05$ were chosen from univariate analysis of the National Surgical Quality Improvement Program (NSQIP) database for the years 2006–2008; which included operating time, red blood cells (RBC), height, age, return to OR, pneumonia, organ/space SSI, sepsis, unplanned intubation, on a ventilator, progressive renal failure, and cardiac arrest requiring CPR. The model was then calibrated by adjusting the relative weight of the cases using the LASSO procedure. Sensitivity and specificity were calculated on the basis of 3-fold cross-validated prediction.

Results: The model reported is the first one to exceed 80% cross-validated sensitivity of the ROC Curve and is described by the following equation: *logit(score) = (–7.763 for CPT 47120 or 47122) (–8.121 for CPT 47125) (–7.595 for CPT 47130). For the years studied, the incidence of pulmonary embolus ranged form 1.11%–1.68%; deep vein thrombosis ranged from 1.56%–2.85% amongst 268 NSQUIP institutions. The model depicted demonstrates 83% sensitivity, 56% specificity, and 6% PPV, with increased risk for age, height, and operating time.

Conclusion: Despite the potential for many false positive results, a sensitivity of 83% indicates that 1) this method may be useful in screening patients for VTE risk after MHR, and 2) helping to assess the need for VTE prophylaxis after major liver surgery.

*The inverse of the logit function is $\text{logit}^{-1}(x) = 1/(1 + \exp(-x))$.

FOS427
A STANDARDIZED PREOPERATIVE CARE PLAN DECREASES MORBIDITY AND LENGTH OF STAY IN PATIENTS UNDERGOING PANCREATODUODENECTOMY

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Introduction: Our hypothesis was that institution of a standardized postoperative care plan would decrease length of stay in ptss undergoing pancreaticoduodenectomy (PD).

Methods: We retrospectively reviewed a prospectively maintained database of 182 pts who underwent pancreatoduodencetomy between January of 2008 and August 2011 at a tertiary referral center. A standardized postoperative care plan was instituted in January of 2011. Mortality, morbidity and length of stay where compared between 141 pts treated prior to (Group 1) and 41 pts treated after institution of the care plan (Group 2). Fisher's exact, student's t-test, and Mann-Whitney U test were used to determine statistical differences in group characteristics and outcomes.

Results: The two groups were comparable in terms of age, pancreatic cancer as diagnosis, neoadjuvant therapy and rate of vascular resection. Length of stay was shorter in Group 2 (median 10) than Group 1 (median 12). Postoperative complications occurred in 63.8% pts in Group 1 and 43.9% pts in Group 2 ($p = 0.029$). Pancreas-specific complications (pancreatic leak) developed in 13.4% and 14.6% ($p = 0.8$).

Conclusion: Standardized postoperative care plan decreases morbidity and length of stay in patients undergoing pancreatoduodenectomy.

FOS428

THE ACCURACY OF MDCT IN PREDICTING PANCREATIC CANCER RESECTABILITY: IS ARTERY ENCASEMENT ALWAYS A SIGN OF INVASION?

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Introduction: Pancreatic cancer is often a late diagnosis, with the signs of extrapancreatic spread already present. Assessment of vascular invasion is an important parameter for determining resectability for PC. A frequent error is to misdiagnose an involved major vessel. Accurate preoperative staging of PC is essential not to deny the opportunity for cure in patients with resectable disease. Our aim was to evaluate the ability of MDCT to assess vascular involvement in patients with PC.

Methods: Our study encompasses 20 cases, selected according to the following criteria: tumoral lesions without a perspective of radical surgery due to invasion of a major arterial vessel, judged by MDCT, in which the preoperative determination of unresectability was not confirmed during surgery. MDCT findings were compared to surgical and pathology gold standards. We defined "vascular invasion" as histological invasion of vessel wall by tumor, "vascular encasement" as radiological circumferential involvement of more than 180 degrees of the artery, and "vascular abutment" as tumor adjacency requiring vascular resection during surgery.

Results: Among these 20 patients, six (30%) had free of tumor vessels, with the possibility of artery skeletonization, including patients with MDCT signs of invasion (radiological absence of a fat plane between tumor and vessel, wall irregularity, vascular encasement); vascular abutment requiring vascular resection during surgery was present in 10 (50%) cases (celiac axis resection was completed in 3 cases); 4 (20%) patients had amenable for R0 resection tumor to vessel adjacency, but were found inoperable because of small liver metastasis, missed during MDCT. Considering our criteria for patient selection, no cases of histologically proven vascular invasion were found in our study.

Conclusion: MDCT has become an important method for preoperative staging, however, alone, it has been shown too inaccurate for the evaluation of resectability, particularly in defining artery invasion. Apparently, surgical exploration with pathological examination remains the "gold standard" from the standpoint of vascular involvement for patients with pancreatic cancer.

FOS429

CAN MDCT PREDICT THE RESECTION STATUS AFTER PANCREATICODUODENECTOMY FOR PANCREATIC ADENOCARCINOMA?

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Introduction: The completeness of resection resulting from pancreaticoduodenectomy for pancreatic cancer has a powerful prognostic significance for recurrence and survival. The superior mesenteric artery (SMA) margin is the most commonly positive following PD, and one that cannot be reresected if the intraoperative frozen section analysis determines that it is positive. 3D-CT is an accurate predictor of resectability for PC. The aim is to figure out whether it can prevent a margin positive resection.

Methods: Retrospective analysis of CT scans and pathohistological reports of 89 cases (62 men and 27 women; mean age 59.6 ± 2) of pancreatic ductal adenocarcinoma after Whipple procedures (2006–2011). We conducted a comparative analysis of demographic, clinical, intraoperative and pathologic characteristics of the two groups of patients: with R0 and R1 resections following PD. The tested specifications included: sex, age, size of tumor (CT and morphology), TNM stage, evaluation of vessel involvement (using 3D reconstructions) and tumor grade. Based on the radiological data, cases of resectable and borderline-resectable tumors were analyzed. Only patients with clear, unequivocal CT evidence of tumor unresectability were excluded from our study.

Results: No gross or microscopic residual disease (R0) was found in 76 (85.4%) patients, which formed the first group (A). Microscopically positive surgical margins (R1) with no gross residual disease was detected in 13 (14.6%) cases (group B). There were no resections with grossly evident residual disease in our study. The accuracy of 3D-CT in determining a margin negative resection was 85%. Patients who underwent vascular resections and reconstructions were more likely to have had an R1 resection. In group B: the average size of tumor was 30.4 ± 3.7 mm ($p < 0.05$); 4 (30.8%) patients had circumferential involvement of a major vessel of more than 180 degrees ($p < 0.05$).

Conclusion: Margin negative resection remains the only potentially curative therapy, prolonging survival and improving the quality of life. MDCT is the most reliable and commonly used method for pancreatic cancer staging, however, in up to 15% irresectability is only seen during operation. 3D-CT imaging increases the diagnostic accuracy of vascular invasion. To avoid unnecessary laparotomies it is important to properly interpret CT data.

FOS430

LAPAROSCOPIC APPROACH IS GOLD STANDARD FOR LEFT LATERAL RESECTION FOR BENIGN LIVER LESION

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Introduction: The left lateral segment of the liver is the first choice for a laparoscopic anatomic resection because of its peripheral location, minimal dissection. In this controlled matched study, we analyzed efficacy of open and laparoscopic left lateral resection for benign lesion.

Methods: 31 laparoscopic left lateral resections were control matched with 31 open left lateral resections by strict selection based on pathology of lesion, size of lesion, ASA grade, BMI, age and sex of the patient.

Results: Despite strict matching of age and sex in both groups, females constitute 80.6% of study population with a mean age of 38.9 years as compared to 19.4% males with a

mean age of 57.9 years. Duration of operation in open group was 243.9 ± 104.6 minutes as compared to 181.7 ± 71.5 minutes in laparoscopic group ($p = 0.048$). Blood loss was significantly lower in laparoscopic group (455.8 ± 593.1 ml vs. 223.0 ± 281.2 ml; $p = 0.035$). Duration of hospital stay was significantly lower in laparoscopic group (8.06 ± 4.4 days vs. 4.1 ± 1.7 days; $p \leq 0.001$). Total cost of hospitalization for left lateral resection in open group was 11504 ± 7776 Euros whereas for laparoscopic group it 7475 ± 2679 Euros ($p \leq 0.001$).

Conclusion: Our strictly control matched study demonstrated operative safety, excellent post-operative outcomes, economic benefits of the laparoscopic liver resection. Moreover postoperative quality of life was higher in the young females after laparoscopic liver resections. Results of the liver surgery are improved, when the benefits of the laparoscopic surgery combined to it, we recommend the laparoscopic left lateral liver resection as a gold standard procedure for benign liver lesions.